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# BIOENVIRONMENTAL SAFETY NEWSLETTER

NAVAL SAFETY CENTER, RADM W. N. LEONARD, COMMANDER



Prepared by Life Sciences Department

## *Safety Implications of Sideburns, Beards and Long Hair*

Z-57, as it pertains to hair, had an impact on the naval community almost of the same magnitude that the musical production of the same name had on the theatre world. Both the Z-gram and the musical express a contemporary spirit. Both of them also have their opponents and their advocates. It is not the wish of Commander, Naval Safety Center to serve as critic regarding either but only to point out that in respect to the first, many questions concerning safety implications have been received. Here is what is currently known:

The fad of longer hair, sideburns and beards is so new that insufficient time has elapsed for trends to appear which might incriminate or eliminate these embellishments as an accident source. Morbidity data are not available. It can be postulated, however, that long hair, sideburns, beards and mustaches may be a potential source of accidents in the following circumstances:

- 1) In life support situations where a respirator must be worn and its effectiveness depends on facepiece seal. Facial hair can interfere with the seal in varying degrees depending on its density, amount and area of coverage.
- 2) When the wearer must work near open flame or hot sparks.
- 3) When the wearer must work with his face close to moving machinery or belt or chain drives.
- 4) In oxygen-rich environments wherein flash-fire is a possibility.
- 5) In environments where pathogen-aerosols are produced.

Protective shields of various kinds can be worn to reduce the danger of accidents in situations 2, 3, 4 and 5. Situation 1, involving the use of respirators, is not as easily resolved or answered because of variables such as criticality of facepiece seal versus toxicity of the challenging atmosphere/environment, exposure time, type of respirator used, degree of familiarity with and frequency of use of the respirator, amount of hair in contact with the facepiece seal and length and density of hair.

(continued)

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This material is for the information of commanding officers, safety officers and medical department personnel and represents the most accurate information currently available on the subject of accident prevention. Contents should not be considered as regulations, orders or directives and may not be construed as incriminating under Art. 31, UCMJ. Contributions are welcomed. Reference to commercial products does not imply Navy endorsement. The views of guest contributors may not necessarily be those of the Naval Safety Center.	

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Commander, Naval Safety Center has consulted leading experts in the field of respirator protection, including designers and manufacturers of these protective devices throughout the country as well as some abroad. There is unanimity among them that beards or long sideburns will compromise the effectiveness of respirator seal. The degree of compromise depends on the variables cited above. How much compromise is tolerable depends on the challenging atmosphere to which the wearer of the respirator is subjected. Some laboratory investigations regarding this problem have been done by sources in the scientific community most knowledgeable in the field of respiratory protection. Their findings seem to confirm the above statements.

Commander, Naval Safety Center is concerned that personnel may arrive at erroneous conclusions concerning the safety of respirator face seals on persons with beards or heavy sideburns based on "in-house trials" where selected bearded individuals are fitted with an OBA or other type respirator and subjected to a challenging environment that contains tear gas or heavy concentrations of smoke. It must be stressed that these trials are not sufficiently refined to reach valid conclusions. One reason for skepticism is because an in-leakage rate test has not been conducted in any of these trials. It cannot be measured without special apparatus. Use of tear gas is too gross a test because the tearing threshold of this gas varies with temperature due to its vapor pressure factor. Lack of tearing, therefore, does not necessarily mean that in-leakage is not occurring.

In view of the foregoing, Commander, Naval Safety Center cannot, at this time, endorse the general conclusion that bearded personnel can wear appropriate respirators (except the continuous feed-positive pressure type) in atmospheres immediately hazardous to life without jeopardizing their safety. Personnel whose jobs require the wearing of these life-support devices must be made fully cognizant of the real possibility of protection compromise whenever facepiece seal is impeded by facial hair.

Readers will be kept informed through this publication and through OPNAV directives of significant new findings as they become known.

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## ***A Man Drives as He Lives-- or Does He?***

You're crawling along in a line of cars stacked up for the expressway exit. It's slow going but traffic is moving steadily. Then some yoyo zips past the 50 or so cars in line, slams on his brakes and forces his way into line far ahead of you, precipitating a series of minor crises for a half-mile back. Gradually things settle down to normal and the only harm is a few hundred dollars worth of brake linings and a little adrenalin. Right? Wrong? Take a look at a 50-car chain collision before you decide.

So far all of you have been nodding in agreement and demonstrating appropriate condemnation of such knavish and irresponsible behavior. Sure you have! But chances are that many of you drive just like that every day. If you do, perhaps you better not read on. You won't like it much.

It has become almost a tenet of driving lore that a man "drives as he lives," that irresponsible drivers are always irresponsible citizens. There's evidence

that this is often true. But it ain't necessarily so. Consider the human animal as a species. Man has spent the last two million or so years evolving from a violent little hominid named Australopithecus Africanus into the magnificently civilized specimens we see around us today. In the process he acquired a veneer of culture and civilization that enabled him to live more or less peacefully with his tribemates, exchanging rule by might for rule by law. Man learned that if he expected to be left in peace he had to grant the same rights to others. So he began to wait in line, to take turns, to refrain from clobbering and being clobbered and generally to exhibit those behaviors which represent maturity and sophistication for a race and for an individual.

This veneer of civilization is frighteningly thin, as wars and other threats to survival so graphically reveal, and for some drivers, the veneer must be a bit patchy. These are the individuals who are kept in line solely by the pressure of society. They play by the rules so long as they can be identified in their transgressions but the cloak of anonymity brings out in them quite a different sort of behavior. While their public actions satisfy all the requirements of a good citizen, their behavior in an automobile is strongly reminiscent of Public Enemy Number One. Rather than driving as they live, they drive as they really are. The impersonality of the highway removes the inhibitions which enable them to function as normal individuals in the sight of their peers and their true personalities are revealed. The irresponsible, thoughtless, immature, inconsiderate boor and sometime killer behind the wheel is the real man, not the serious, well-behaved alter ego.

So think about it. Could you stand to have your value as a human being measured on the basis of your driving behavior? If not, it's time for a long talk with your other personality. After a while, you may remember, Mr. Hyde won out over Dr. Jekyll.

### Mr. Hyde and Go Seek

Our hero was always a citizen straight,  
Until he jumped into his Belchfire V-8.  
At work and at home a considerate one,  
But out on the road — Boy! Attila, the Hun!  
From office to auto, like donning a mask  
Or taking one off. No one ever dared ask.  
In a flash, this mild-acting husband and Dad  
Was changed to a leadfooted, fire-breathing cad.  
With a screaming of rubber this family cat  
Hurled himself down the road — the proverbial bat.  
As every good racer so carefully reckons  
He measured his progress in split milliseconds,  
And every small increment cut off his time  
Made our hero elated, his ego sublime.  
The faster he flew, the more he got grim  
'Bout what all these slow drivers were doing to him.

Heel 'n toe, brake 'n throttle, he charged through the pack,  
Squeezing one, then another, and never looked back  
Toward the shrieks of brake linings, the brake lights aflashing  
The fists raised in anger, the teeth that were gnashing.  
On he roared ever homeward, cutting out, cutting in,  
Those who yielded got "Chicken!" and a small sneering grin.  
Never giving a thought to debris in his wake  
Our hero at last made one little mistake.  
The next guy he squeezed was as crazy as he,  
And the outcome resulting was something to see!  
There were pieces of auto from here clear to Nome,  
And as for our hero — well, he finally got home.  
But not in the same shape as when he began,  
A sadder but hopefully wiser young man.  
The law of the highway's grim jungle is stern,  
And, once more we echo, some folks never learn.

-LT Norman E. Lane, MSC, USN  
Naval Safety Center

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## Not Necessarily How Much You Lift, But How

(The following item was authored by J. H. Clement, Safety Administrator of the Pearl Harbor Naval Shipyard, several years ago. It has been reprinted in several national publications and is as timely today as when it was written.)

"Bad backs" are not uncommon. Many good backs become bad backs when we don't understand what we are doing to them while lifting. Many people suffer for years as a result of not being aware of a few simple lifting rules. Think of the whole thing in terms of levers....

The movable human body is a system of levers made of bone, cables made of tendons, and motors made of muscle. Being joined to the bony structure at hip level, the backbone as a lever swings up and down by pivoting on the hip joints. The body's largest muscle--the one we sit on--supplies the power to lift the backbone. This muscle is anchored in the inner thigh and pushes downward from the back at the top of the hip bones, transferring the total load to the feet.

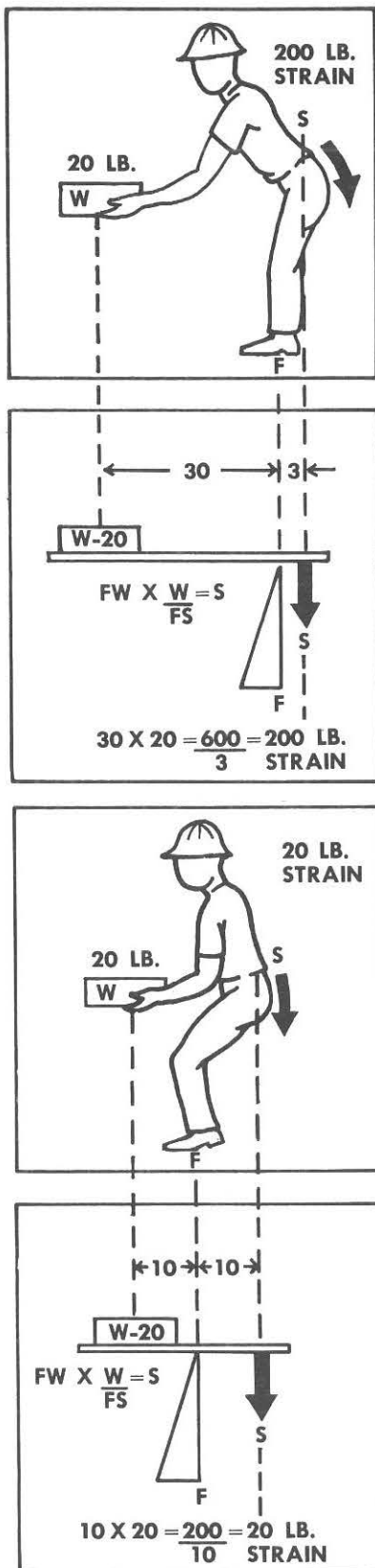
By measuring a human spine and picturing it as a lever resting on a fulcrum, with the end opposite the weight being pulled downward, one can readily calculate the strain involved. Here we see how lifting a 20 pound weight causes a 200 pound pull on the lower back. The mathematics are: Distance from Weight to Fulcrum times the Weight, divided by distance from the Fulcrum to the point where Strain is applied. The mechanical disadvantage in this arrangement is obvious.

Here is a man who knows what he is doing with his back. In staying close to the weight and keeping his back almost erect, he has changed the lever arrangement much to his advantage. He also is protecting the weakest point in his back by using the body's strongest levers--the leg bones--and the most powerful motors--the leg muscles--to lift the weight safely.

And what a difference it makes. With the same weight, the pull on the lower back is now only 20 pounds. So...we should all follow these rules.

- Stay close. Never reach out with a load.
- Don't twist the body while lifting. To turn the body, walk around with the feet.
- Never, ever, pull or jerk a load suddenly. Jerking loads is for professional weight lifters only and if you will notice, professionals are safety-wise and make every lift from exactly the right position.

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## Preventing Hand Injuries Is an All Hands Job

A recent review of hand injuries occurring aboard ship and ashore in calendar year 1970 showed in many cases such a lack of safety precautions that we decided to discuss a month of reports in BESNL in some detail. We selected April because another April is now upon us and perhaps knowledge of what happened last year can help prevent similar injuries this year.

During April, 1970, 15 finger amputations, 18 finger lacerations, three avulsion injuries, one fracture injury with two fingers involved and two miscellaneous hand injuries were reported to the Naval Safety Center for a total of 39.

Amputations: The most frequent agent of injury was moving machinery. Frequently involved were failure to observe safety precautions and failure to use safety guards.

. A man sawing material in a band saw thought the material was sawed through and reached for the cut-off piece. It rolled and his right middle finger was caught between the material and the vise and amputated at the first joint. He should have secured the saw before putting his hands near the material.

. A man using a lathe to machine a part saw that it was not working properly. Without securing the lathe, he removed the end cover plate. While he was checking the V-belt, his right index finger was caught between the belt and a pulley and the tip was amputated.

. In a galley an enlisted man using a vegetable slicer was distracted when someone came up to him. His finger contacted the blade and was amputated. He was not using the handling plunger provided. (The report does not state whether or not this was a meat and vegetable cutter. If it was, a safety interlock switch should be installed as required by NAVSHIPS Technical Manual, Chapter 9340, article 7. The interlock prevents operation of the machine when the guard is not locked in the guard position.)

. While mowing a station lawn with a power mower, a man lost two fingertips as he tried to remove a piece of wire caught in the mower. The wire had stopped the cutting reel. Without disengaging the reel, he pried the cutting blade backwards with a small screwdriver. The wire came loose and the reel started forward, amputating his right third and fourth fingertips.

. A man attempted to free a jammed anchor windlass, first, with a flat bar, then with his hand. He lost his left index finger as the slide actuated. Another man lost a fingertip when he tried to align steam flanges by placing his finger in the hole and one side of the flange, being held by a chain fall, slipped. Still another amputation occurred because of faulty communications. As a man was installing a V-belt on a diesel boat engine, signals were misinterpreted and the engine was started while he was still checking belt tension. His left thumb was amputated when caught between the belt and the pulley.

Lacerations accounted for 18 hand injury reports last April. The majority of the injuries occurred as the men worked with moving machinery. Hand tools were involved in several of the injuries, in one of which haste was a factor. Hatch covers slamming on hands inflicted injury in three instances; one of these also in-

volved two fractured fingers. A man washing pots in a deep sink sustained a severe laceration of his thumb and two other men were injured by breaking glass. Still another laceration injury occurred when a man cut his thumb while tossing a sharp piece of metal over the side. Two cuts during off-duty recreation were reported--one at a bowling alley as a man's finger was caught between two bowling balls and the second on a fishing trip when a man's slippery hand slid from the knife handle across the blade. Failure to secure machinery before attempting an adjustment caused another hand laceration during this period.

Avulsions: Machinery accounted for all three avulsion injuries during this period. In addition, there was a puncture injury when a man cleaning a meat tenderizer in a galley accidentally hit the on switch and sustained multiple puncture wounds of his right third and fourth fingers.

In the final hand injury to be described here, a man standing fantail watch aboard ship was walking along when he kicked a pipe-shaped object with a ring on one end. He told investigators that he picked it up, caught his gloved finger in the ring and it exploded in his hand. The device was a hand grenade fuze. It was found that the lock and staple portion were missing from a ready service locker on the fantail from which the grenade apparently had been taken.

Prevention: By no means can all hand injuries be prevented by safety education. For instance, last April a man's hand was severely cut when he slammed a beer glass on a bar and squeezed it so hard that it shattered. But in most categories of accidents, safety education can help.

On reviewing the above injuries, some obvious safety precautions--on and off the job--come to mind. Such safety sense should continually be reemphasized to all hands in all media available--station papers, plans of the day, stand-up safety talks and even "homemade" posters.

- . Keep your hands away from moving machinery and fanbelts. Where possible, secure the machine before attempting adjustment or repair.
- . When using power tools in the shop or galley, be sure that all safety guards are in place and that you know exactly what you are doing and how to do it.
- . Don't work with wet or slippery hands.
- . Don't experiment with or investigate an unknown object. (Here we have the hand grenade fuze accident in mind.) Report your find to some responsible person and avoid a possible mishap.
- . Secure hatches aboard ship properly and exercise caution when going through hatches.
- . When working with others, be sure all intentions are communicated clearly and that you have your signals straight.
- . Above all, don't rush, don't take shortcuts and don't bypass safety precautions.

A hand injury can be permanently disabling. Take care of yourself and if you see another man taking chances, put him straight. Hand safety is an all hands job!

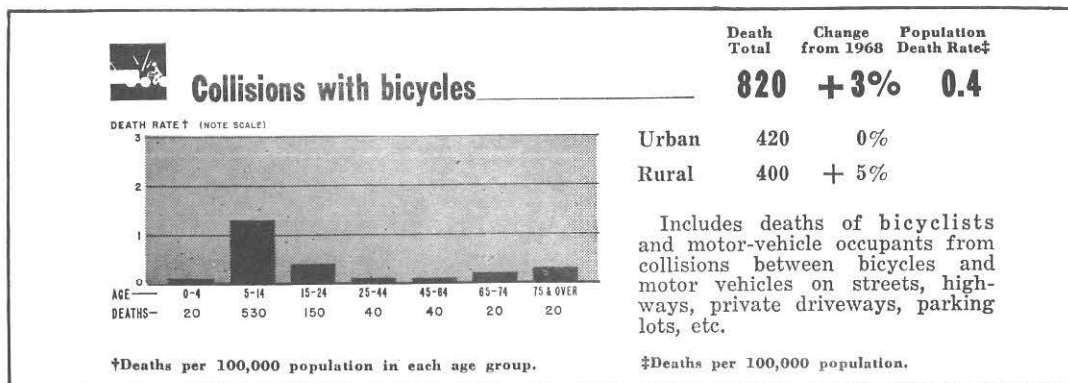
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## Bicycle Driver Safety \*

Bicycles are used for Navy transportation in shops, warehouses, shipyards and other areas. In addition, thousands of civilian and military personnel ride bikes for recreation and exercise.

Not so long ago a Navy commander and his daughters were bicycling on the paved driveway of their home. While showing the girls a particular riding technique (not described in the accident report), his bike slipped. He fell, breaking his left ankle and straining his knee. The command reported it has instituted a vigorous bicycle riding training syllabus and modified the commander's bike with training wheels, pending his full qualification.

We don't know if the commander managed a chuckle about the training wheels as he thumped around in his cast but we do know that with the increasing popularity of bikes (the number has quadrupled since World War II), bicycle injuries and fatalities are a sizeable safety problem. Take collisions between bikes and motor vehicles, for instance. According to the National Safety Council's Accident Facts there were 820 deaths of bicyclists and motor-vehicle occupants from collisions between bikes and motor vehicles in 1969. In the same period there were 39,000 injuries.

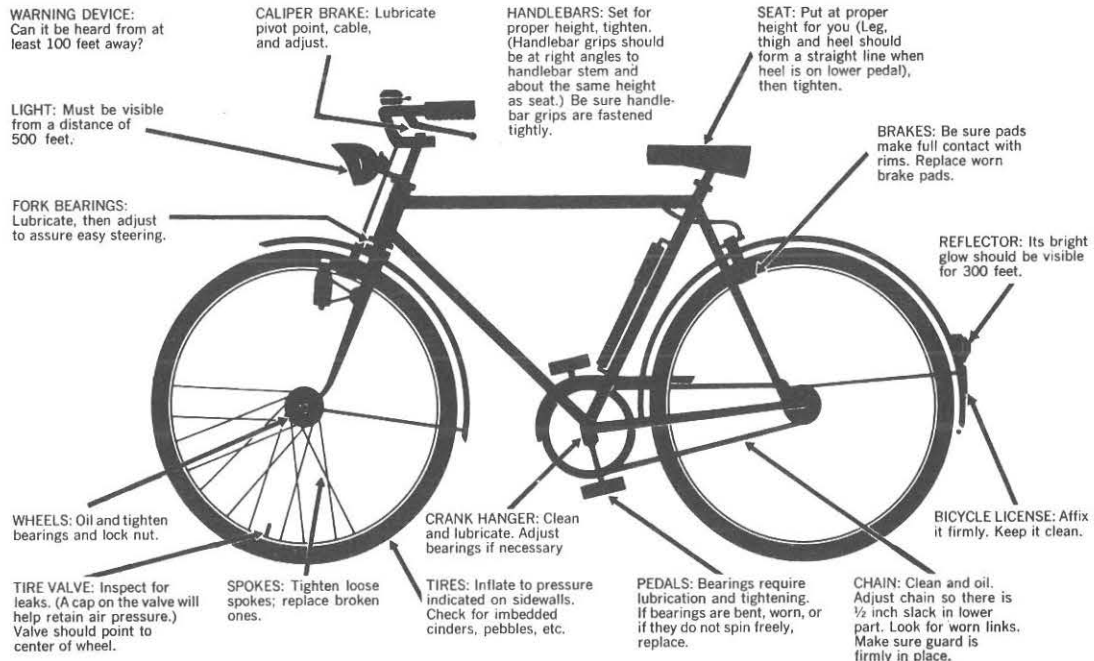


National Safety Council data indicate that most cycling accidents occur during the spring and summer months, April through August accounting for nearly 3/4 of all bike mishaps during the year. More bike accidents happen on Saturday than any other day in the week, reflecting high usage on that day. Again, most reported accidents occur during daylight. Severity of bike accidents, however, increases after dark.

According to a National Safety Council survey, collisions between motor vehicles and bicycles occur about as follows:

- . 50 percent occur at intersections.
- . 70 percent happen during daylight hours.
- . 80 percent of the bicyclists killed or injured in traffic accidents are violating traffic laws at the time of the accident.
- . 50 percent of the motor vehicle-bicycle accidents involve a violation on the part of the motor vehicle operator.
- . 20 percent of the bicycles involved in accidents have some mechanical defect.

\*Current safety usage is "bicycle driver" instead of "bicycle rider." The term "driver" indicates an individual in control of a vehicle with a responsibility which the term "rider" lacks.



The most common traffic violations of cyclists are:

- . Riding in the middle of the street.
- . Failure to yield right of way. (In most cases, the cyclist didn't "see" the car; in some cases he intentionally infringed on the motorist's right of way.)
- . Riding too fast for conditions.
- . Disregard of traffic signs or signals.
- . Riding against the flow of traffic.
- . Improper turning.

Other bicycling injuries are caused by falls on slippery surfaces, deep ruts, sand, gravel; collision with pedestrians or fixed objects; and falls from defective or overloaded bicycles.

#### Bicycling technique tips:

- . Always keep your bike under control.
- . Observe all traffic regulations.
- . Ride with the flow of traffic, not against traffic.
- . Slow down at all intersections. Look both ways: left, then right, then left again before crossing.
- . Use hand signals to indicate your intentions.
- . Avoid crowding between cars at stop signs or between a car and the curb.
- . Never hold on to a moving vehicle or in any way attach your bike to the vehicle.
- . Keep to the right and ride single file.

. To turn left at intersections in a busy area or where there is heavy or high-speed vehicular traffic, dismount and follow the pedestrian crosswalk to the far right corner, then proceed across at right angles.

. When overtaking slow-moving vehicles, be careful to avoid being struck or crowded by vehicles about to turn into a driveway or alley.

. Be especially alert when passing parked cars for doors which might open in your path.

. Carrying more passengers than the bicycle is designed and equipped for is dangerous and illegal. Packages should be carried in a basket or rack.

. Make sure your bike is in safe mechanical condition.

. If you must drive your bike at night, have a white headlight and a red reflector on the rear. Wear white, light-colored or reflective clothing.

. Don't stunt or race in traffic.

The fact that the death and injury rates have stayed below the rate of increase of bicyclists is encouraging. However, traffic congestion is increasing and the number of cyclists is still on the upswing. Non-fatal injuries are gradually climbing toward the 40,000 mark with fatalities increasing at a lesser rate. The bike driver must be even more observant of traffic regulations and common sense safety. He must always be aware that in a collision or spill his bicycle offers him no protection. And regardless of his legal position, it is in the bike driver's own interest to give the motorist the right of way.

Bicycling is cheap, efficient transportation, good recreation and great for your health. Let's keep it safe!

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## **Suspected Amphetamine Poisoning of a Coffee Mess**

Between 1130-1500, eight patients from an avionics shop were seen in a medical department. Symptoms were suggestive of some type of stimulant poisoning. Each patient gave a common history of coffee ingestion from the shop coffee mess shortly before onset of noticeable symptoms. All were treated symptomatically and appropriate urine and blood specimens were taken for analysis. Everyone regained normal or near normal bodily function within 24 hours without hospitalization.

The remainder of the prepared coffee and all coffee mess supplies were taken for analysis. Subsequent laboratory analysis of the coffee specimens and the patients' specimens revealed no evidence of drugs. This negative evidence notwithstanding, evaluation of the epidemiological history and symptomatology of the patients leaves little doubt that a stimulant drug was introduced into the coffee. On clinical grounds alone it appears to have been one of the amphetamines. How the coffee was contaminated is unknown. That similar episodes may occur in the future in other coffee messes is a distinct possibility.

At the first suspicion that personnel may have been poisoned, the Medical Department should be notified in order that it can initiate appropriate action. This includes saving of first voided urine samples after appearance of symptoms, proper collection and preservation of food samples, treatment of all patients (not just those who report to sick bay of their own volition), control of hysteria and prompt notification of special medical investigation personnel at distant points whose services may be required in the investigation.

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## Poison-Proof Your Home

Accidental poisoning in the home caused 2,000 deaths in 1969, according to the National Safety Council. These statistics represent a 5 percent increase over the preceding year.\* An estimated half-million children, 90 percent of them under age five, will be victims of accidental poisoning this year. In 1969, poisoning was the fifth most frequent cause of deaths of children age one to four, following motor vehicle accidents, fires and burns, drowning and falls, in that order.

Approximately half of all accidental ingestions of poisonous materials by children reported to the Public Health Service involve internal medications. Half of these accidents involve aspirin. Aspirin should be kept out of sight and out of reach of children even if the bottle has a safety cap. Considering the agility, mobility and ingenuity of the average child, a safety cap on a medicine bottle should never lull parents into false security. Other substances responsible for child poisoning are cleaners, kerosene, lighter fluid, furniture polishes and waxes, toilet bowl and drain cleaners, pesticides, insecticides and disinfectants.

Of all the rooms in the house the kitchen is the most dangerous when it comes to poisonings. Approximately one-third of all poisoning accidents occur in the kitchen. In almost two-thirds of all kitchen accidents, substances involved were not in their customary storage places. In more than one-fourth of these accidents, the substances involved were not in their original containers.

All products should be kept in their original containers and foods and household products should be kept separate. Cups or soft-drink bottles should never be used for such materials as paint thinner, turpentine or gasoline. Naturally enough, children tend to associate cups, soft drink bottles and drinking glasses with food and drink. Several fatalities have been reported in which charcoal lighter fluid used to start outdoor barbecue fires was poured into just such containers and accidentally drunk.

Another point to remember is that poisoning accidents are not always related to ingestion. Poisoning can result from inhalation or absorption of toxic substances through the skin. When using such an item such as a pesticide, insecticide or cleaning solvent, read the label carefully, use the product only for its intended purpose and follow directions.

Here are some brief pointers on how to poison-proof your home:

- . Keep household products and medicines out of reach and out of sight of children, preferably in a locked cabinet or closet. Even if you must leave the room for only an instant, remove the container to a safe spot. Return medicines to a safe place immediately after use.

- . Store medicines separately from other household products and keep these items in their original containers--never in cups or soft-drink bottles.

- . Be sure that all products are properly labelled and read the label before using.

- . Always turn the light on when giving or taking medicine.

- . Since children tend to imitate adults, avoid taking medications in their presence.

- . Never call medicine "candy" when administering it to a child. Refer to

\*The National Safety Council includes in this figure deaths from solids and liquids (medicines as well as commonly recognized poisons) and deaths from mushrooms and shellfish. Fatalities from spoiled food, such as in cases of botulism, are not included.

### CHILD-RESISTANT PACKAGING NOW LAW

Child-resistant packaging will now help to protect children from serious injury, illness, or death resulting from the use or ingestion of hazardous substances.

The protective packaging was made mandatory by the Poison Prevention Packaging Act (an amendment to the Federal Hazardous Substances Act) passed by the 91st Congress and recently signed into law by the President.

The amendment calls for the establishment of a 15-member technical advisory committee to provide technical expertise and consultation as an aid to the Secretary of Health, Education and Welfare in establishing standards for child-resistant packaging. The advisory committee will be composed of representatives of the Department of Health, Education and Welfare; manufacturers of household consumer products; and widely recognized independent packaging consultants.

The Poison Prevention Packaging Act encompasses most products and substances that are produced for use in and around the household.

Failure to conform to the special packaging standards could result in either a fine up to \$500 or a maximum of 90 days imprisonment, or both; or seizure of the product.

-Emergency Health Services

New York State Department of Health

medicines by their proper names. If a child thinks a medicine is "candy," when left alone he may locate the bottle and eat or drink its contents.

. Clean out your medicine cabinet periodically. Get rid of old medicines by flushing them down the drain. Rinse the containers in water and then discard them.

Protect yourself and your family from accidental poisoning.

If in spite of all precautions there is a poisoning accident, get help promptly. Call a doctor, a hospital, a poison center or the police. If you must go to a doctor's office or hospital emergency room, take the poisonous substance's package or container--label intact--along with you.

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## **Rings and Fingers**

Reports of finger amputations and injuries from rings catching on projections continue to come in to the Naval Safety Center. In fiscal year 1970 there were 13 such instances reported on OPNAV 5100 (Accidental Injury/Death Report). Six of these were finger amputations and seven were severe lacerations and avulsions. The best thing to do is to leave rings off when on the job. Many industries now require this. A compromise solution, although second-best to no rings at all, is the use of breakaway slots described in BESNL 3-70, page 5.

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## **How to Slow Down the Harmful Effects of Smoking**

We'd much prefer that everybody quit smoking cigarettes altogether, but for some persons, this seems to be an impossibility. Even if a person can't give up smoking, there are ways he can improve the situation by cutting down. The following material from the Public Health Service, Department of Health, Education and Welfare, is a good discussion of methods and benefits of cutting down.

About a million and a half Americans swear off smoking each year--some on their doctor's advice, others because their own common sense tells them it is ridiculous to take the risks involved. Yet tens of millions continue to smoke, either because they are unable or unwilling to quit.

Is there anything such a person--perhaps you--can do to slow down the harmful effects of smoking?

Actually, there are five things. But remember, doing these will not make smoking "safe." Anything you may do short of quitting completely is merely a compromise. So first ask yourself if cigarettes really mean enough to you to take risks such as these:

### Lung Cancer

Cigarette smoking as we know it is a habit that originated only about 60 years ago. At that time lung cancer was a rare disease. Today, among American men, it is the leading cause of death from cancer--and is growing in epidemic proportions.

Studies show that the risk of death from lung cancer is 10 times greater for the average male smoker than for the nonsmoker. Recent study reveals that lung cancer is also on the upswing among women with those who smoke a pack or more a day having a death rate up to five times higher than nonsmokers.

The most chilling aspect of lung cancer is that cures are rare. Ninety out of every 100 people who develop lung cancer are dead within five years. Even the first year survival rate is only 25 percent.

### Emphysema and Chronic Bronchitis

Emphysema, a crippling lung disease, and chronic bronchitis are hard to tell apart because their symptoms can be similar--shortness of breath, chronic cough, and the tendency to tire easily. Emphysema creeps up on its victims almost unnoticed. The tiny air sacs in the lungs lose their elasticity and rupture, and used air cannot be breathed out. The heart must work harder to pump oxygen-starved blood to needy body tissues. Death often results from respiratory failure or an overtaxed heart.

Emphysema and chronic bronchitis are more than twice as prevalent among male smokers than among nonsmokers, and three times as prevalent among women smokers than among women who have never smoked. Anyone who raises increasing amounts of phlegm, who has persistent shortness of breath, and who continues to smoke cigarettes makes chronic chest diseases more severe.

## Coronary Heart Disease

Coronary heart disease now kills about half a million American men and women each year. Over 90,000 of these deaths occur because cigarette smokers have higher death rates from coronary heart disease than nonsmokers. Men who smoke cigarettes, for example, have a death rate that is, on the average, 80 percent higher than that of nonsmokers. And for two-pack-a-day smokers this jumps to as much as 200 percent higher.

While these diseases are the principal causes of death attributable to cigarette smoking, they are by no means the only ones. Perhaps the most sobering statistic of all is this: the rate of early death from all causes ranges from 40 to 120 percent higher for smokers than nonsmokers, depending upon the amount smoked daily.

What can you do to lower your intake of all cigarette smoke? Here are five positive steps:

1. Choose a cigarette with less tar and nicotine.

One way to cut down your smoking is to switch to a cigarette with less tar and nicotine.

Learn the tar and nicotine content of your cigarette. The Federal Trade Commission gives the latest tar and nicotine ratings for all leading brands of cigarettes. Note how much one brand varies from another--by as much as 2 to 1, or even more. See how your brand compares. Find out how much you can reduce your tar and nicotine intake by switching to another brand, or to another version of the brand you are presently smoking.

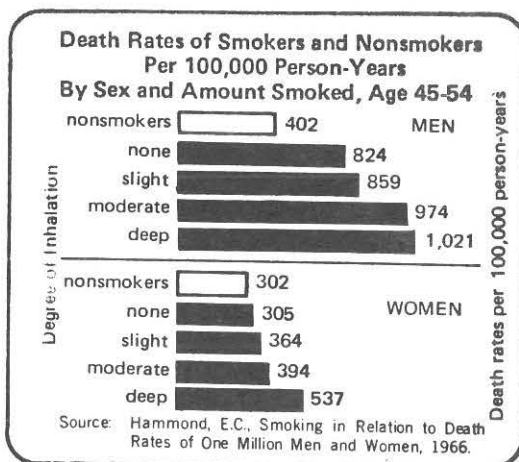
2. Don't smoke your cigarette all the way down.

No matter which cigarette you smoke, the most intake of tar and nicotine occurs in your last few puffs. This is because the tobacco itself acts as a filter, retaining a portion of the tars and nicotine that pass through it. Thus, smoke from the first half of a cigarette yields only about 40 percent of the total tar and nicotine.

But the last half--where the tobacco-filtered tars and nicotine are stored--yields 60 percent. So the sooner you put your cigarette out, the lower your dose of these harmful ingredients. This fact also points up the added risk of the new "longer" cigarettes. Their "extra puffs" are really "extra perils" for you.

3. Take fewer draws on each cigarette.

Even if you can't stop smoking, try reducing the number of times you puff on each cigarette. With practice, some people find they can substantially cut their actual smoking without really missing it.

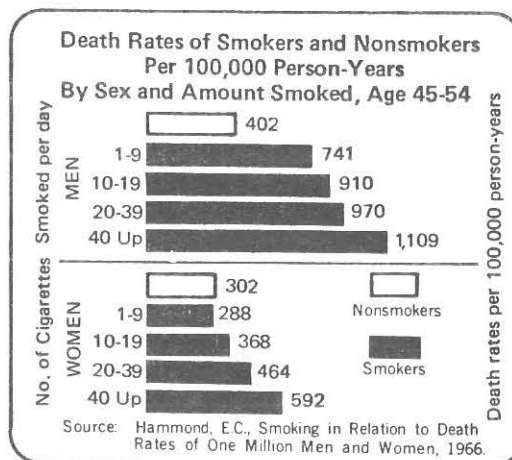
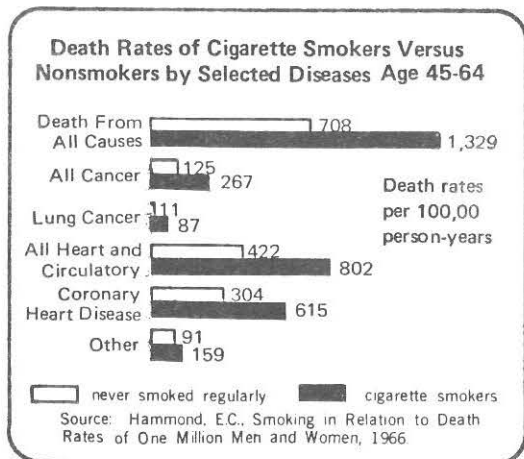




#### 4. Reduce your inhaling.

Easier said than done? Perhaps. But remember it is the smoke which enters your lungs that does most of the damage. It is this smoke that injures the cleaning mechanism of the lungs and accelerates the development and progression of emphysema. And it is largely this smoke that promotes the cardiovascular changes which can bring on heart attacks.

Death rates of cigarette smokers increase with degree of inhalation. Make an effort to reduce the depth of your inhaling and its frequency. (Cigar and pipe smokers are not so apt to inhale; this is probably why they are less likely to have lung cancer and many of the other diseases associated with cigarette smoking.)



#### 5. Smoke fewer cigarettes each day.

For some people this is surprisingly easy, but for others it may be the most difficult step of all. Here are some ideas that may help:

Pick a time of day when you promise yourself not to smoke. It may be before breakfast. Or while driving to work. Or after a certain hour each evening. It's always easier to postpone a cigarette if you know you will be having one later.

Maybe you're a pack-a-day smoker. Try buying your next pack an hour later each day. Stretch your supply by stretching the periods between each smoke. It may also help to carry your cigarettes in a different pocket. Or, at work keep them in a drawer of your desk or in your locker--any place where you aren't able to reach for one automatically.

The trick is to change the habit patterns you have established. Make a habit of asking yourself, "Do I really want this cigarette?" before you light up. You may be surprised at how many cigarettes you smoke that you don't really want.

One final thought. If you must smoke, by all means follow these simple rules. Then add another precaution: a health checkup at least once a year. Or if you spot such warning signs as constant coughing, chest pains, shortness of breath and wheezing, don't wait--see your doctor at once.

U.S. DEPARTMENT OF  
HEALTH, EDUCATION, AND WELFARE  
Public Health Service  
Health Services and Mental Health Administration  
National Clearinghouse for Smoking and Health  
Rockville, Maryland 20852

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## Eye Injuries Require Prompt, Professional Medical Attention

There were 90,000 disabling work injuries involving the eyes in the United States in 1969, alone, according to National Safety Council. Navy statistics are not available for this period but during Fiscal Year 1970 the Navy reported 171 eye injuries to military and civilian personnel.

Since many eye injuries are preventable, the basic remedy is to correct unsafe human behavior. Causes of eye injuries range from failure to follow routine safety precautions and failure to use protective equipment to acts comparable to playing "Russian roulette."

An eye injury requires immediate medical attention--even apparently uncomplicated eye injuries can endanger vision. Here are some basic first aid measures for eye injuries but they are in no case to be considered substitutes for prompt professional medical attention.

Contusion (blow to eye): Cold compresses are ideal. Some of the complications which can result from a contusion to the eye are fractures of the surrounding bones, tissue lacerations, hemorrhage into the eye, retinal detachment and blindness. Therefore, do not delay medical evaluation for apparently uncomplicated eye contusions.

Laceration (cut): A laceration to the eyelid or to the globe, itself, is serious. Deformity of the eyelid, constant tearing and possible loss of the eye can result. Cover the affected eye with a sterile eye-patch and do not apply pressure to the eyeball. Rush to a doctor.

Corneal abrasion (ulcer): Put the eye "to rest" by patching it with a sterile gauze pad. In any eye ailment patching the unaffected eye in addition to the injured eye enhances relief from pain. The patient will require medical attention and observation.

Foreign bodies: In general, wash out the loose material and patch the eye. If the material cannot be washed out (that is, if it is embedded) do not try to remove it. Patch the eye and let the doctor take over as soon as possible.

Ultraviolet injuries (from sun, sunlamps, welding arcs): Ultraviolet injuries are dangerous as well as painful. Cold compresses are good and ice compresses are better. See your medical department immediately.

Chemical injury: Delay in treatment of chemical injury to the eye can lead to blindness. Immediate and prolonged irrigation with water for at least 30 minutes is imperative. Several 30-minute irrigations may be required to ensure riddance of the chemical. Ice compresses will decrease the pain between irrigations. Prompt medical review is called for.

As we said before, the information above is in no way to be considered a substitute for prompt, professional medical attention. Be alert for the possibility of eye injury--prevent it in the first place by protective equipment and safety precautions in eye hazardous areas. If an eye injury should occur, beyond simple first aid it's a matter for the medical department.

- LCDR Paul E. Petit, MC, USN  
Naval Safety Center

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## Moonlighting Can Be Hazardous

From time to time the Naval Safety Center receives accident reports on men who are hurt on off-duty jobs. For instance, a Navy man moonlighting in the meat department of a supermarket energized a hamburger machine, his right hand was not clear of the blades and his second and third fingers were amputated. An occasional reminder in the ship and station plan of the day that safety means safety 24 hours a day is in order--safety on the Navy job, safety in the home, safety behind the wheel of the family automobile and in the case of moonlighters, safety on the second job.

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## Navy Motor Vehicle Death Statistics for Calendar Year 1970

Off-duty vehicular accidents were the leading cause of accidental deaths of active duty Navy personnel in 1970. Three hundred and fifty-two Navy deaths as a result of accidents involving privately-owned motor vehicles (POV) were reported to the Naval Safety Center during the calendar year--a figure far surpassing operational accidental deaths in non-combat duty status for the same period. This total, the equivalent of the crew of a destroyer, breaks down into 266 four-wheel vehicle deaths, 54 two-wheel vehicle deaths and 32 Navy pedestrian deaths. (In addition, there were five Navy deaths in government-owned 4-wheel vehicles.)

The seasonal peak for POV deaths was the month of July when there were 36. (Please see Figure 1.) October was the second worst month with 33. The "safest" month by comparison was September with 21 deaths. September's total reflects the

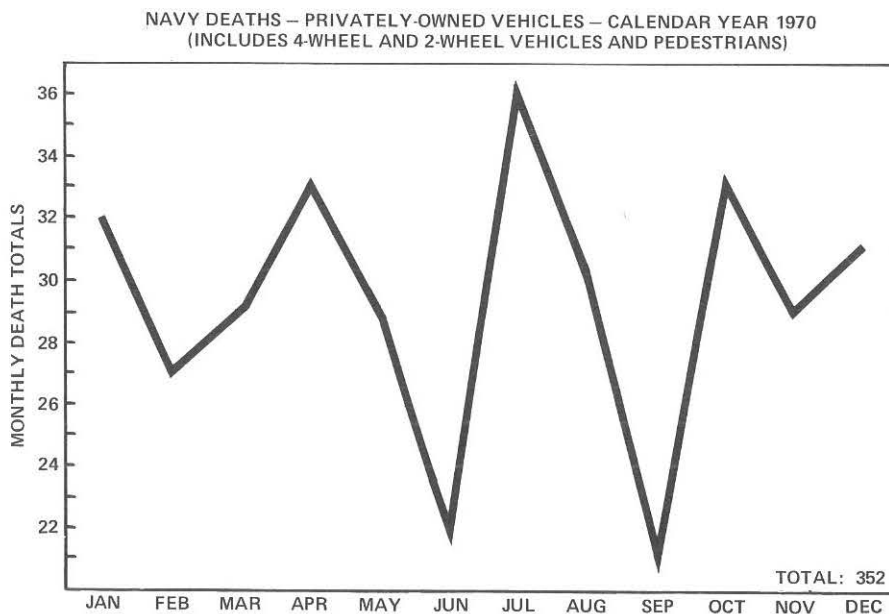


FIGURE 1

year's low in POV 4-wheel vehicle deaths (Figure 2) and the year's low in pedestrian deaths.

Thirty-two Navy pedestrians were killed as a result of POV accidents during 1970. Month by month, the record was: January, 2; February, 2; March, 3; April, 6; May, 3; June, 3; July, 4; August, 1; September, 0; October, 3; November, 3; and December, 2.

# NAVY DEATHS - PRIVATELY OWNED 4-WHEEL VEHICLES - CALENDAR YEAR 1970

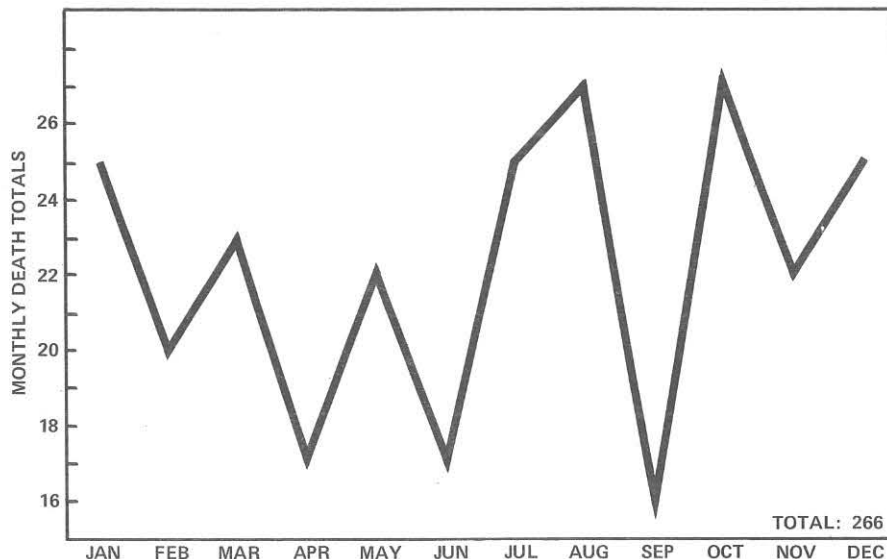


FIGURE 2

For the year's record on POV 2-wheel vehicle deaths please see Figure 3.

# NAVY DEATHS - PRIVATELY-OWNED 2-WHEEL VEHICLES - CALENDAR YEAR 1970

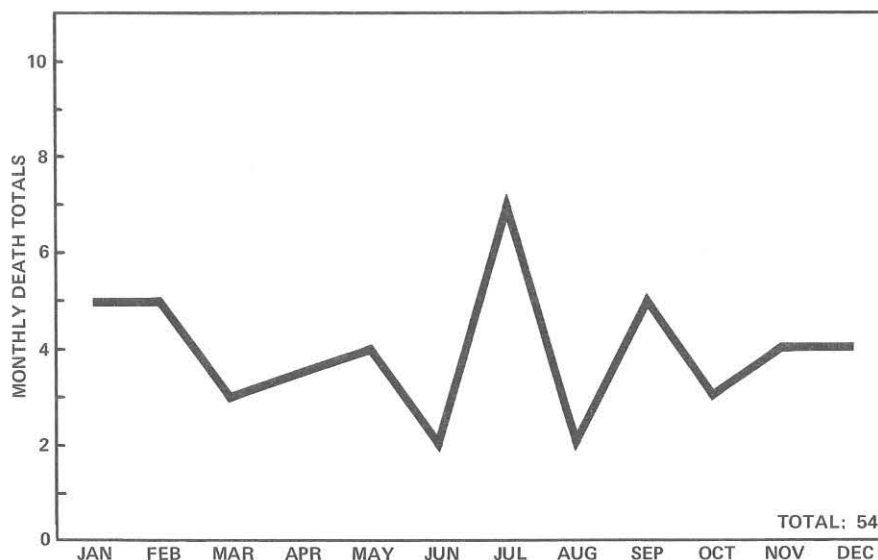


FIGURE 3

The basis for the statistics above are the SF91A (Investigation Report of Motor Vehicle Accident); BuPers casualty messages; and OPNAV Form 5100/1 (Accidental Injury/Death Report). However, in spite of OPNAV Instruction 5100.12 which requires submission of SF91A to the Naval Safety Center in all cases of motor vehicle accidental death or disabling injury, reporting is still not as good as it should be. By comparison with BuPers casualty messages, copies of which are mailed by BuPers to the Naval Safety Center, it is evident that some accidents are not

being reported on SF91A. In addition, the Naval Safety Center is not receiving the direct message report required from the cognizant commands when motor vehicle deaths or serious injuries occur. OPNAVINST 5100.12 states that: "A message report shall be prepared for each motor vehicle fatality involving Navy military... (this report) shall be submitted to the Naval Safety Center..."

If the Navy is to reduce accidental motor vehicle deaths and injuries through safety education and recommendations directed at accident trends, we must have prompt, accurate and complete reports. Off-duty Navy motor vehicle accidents and injuries represent an intolerable drain on Navy manpower and operational readiness. Reports of motor vehicle accidents involving Navy personnel should represent the best thinking of the reporting command.

- Charles W. Eisele, Jr.  
Naval Safety Center

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## **Free Safety Films Available**

An invaluable source of safety material is the Department of the Navy Catalog of Free Safety Films (NavMat P-5101 September 1969, stock number D518-100-0000) compiled by the safety division, Headquarters, Naval Material Command.

The free films are available from various government agencies, industry, insurance companies, universities and public service groups.

The film catalog is divided into two sections: 16mm sound motion picture films and 35mm sound slidefilms. A brief description of each film is given as well as running time, color or black and white and, in most cases, date of production. All of the films are available on temporary loan from the distributors free of charge except for return mailing costs. Films should be requested at least 3 to 4 weeks ahead of the time you wish to show them.

Here are just a few of the general safety categories represented by the films: boating, water safety and water sports, ear protection, eye protection, fire protection, home safety, lifting, machine operation and guarding, materials handling safety and motor vehicle and pedestrian safety.

Such safety films, especially those on motor vehicle and pedestrian safety, might make good "short subjects" along with your ship or station movies. Or they could be used in conjunction with safety talks or even on closed circuit television aboard ship prior to a CONUS in port period. Such films are also good visual aids to promote off-duty safety. For example, they could be shown in community youth programs. Remember, a picture is said to be worth a thousand words.

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## Medical Officers: Record Body Marks, Scars Accurately, Completely on SF88

Examination of hundreds of Standard Form 88's (Report of Physical Examination) over several years has indicated a definite lack of effort and exactness in recording body marks and scars. This is the sort of information that, perhaps, fits into the "interesting but useless" category for most members of the naval service. However, on occasion this information has been quite vital in identification of remains. It can also assist in identification of injured personnel. Unfortunately, the desired information is usually not recorded conscientiously in an accurate form. For purposes of review, the Manual of the Medical Department (16-39) is quoted:

"1. The medical examiner shall make a careful inspection of the body, front and rear, on each side of the median line separately, commencing with the scalp and ending at the foot, and record under the "Notes" section of the face of the SF 88 all body marks, tattoos and scars of value for purposes of identification. If no marks or scars are found, this fact shall be stated.

"2. The sizes of scars, moles, warts, birthmarks, etc., shall be indicated in inches or fractions thereof, except in the case of pinhead moles for which the abbreviation "p.m." shall be used. Pinhead moles are those presenting a diameter of less than one-eighth of an inch. When recording the location of a tattoo mark, a narrative description of the design shall be included. Tattoo transcriptions of words or initials shall be recorded in capital letters. The size of a tattoo need be described only regarding its general dimensions. A statement relative to color or pigment is not required. Amputations and losses of parts of fingers and toes should be noted, showing the number of the particular digit injured and the extent or level of absence.

"3. The following are authorized abbreviations for the description or conditions indicated: amp.--amputation, f.--flat, fl.--fleshy, h.--hairy, lr.--linear, m.--moles, p.--pitted, p.m.--pinhead mole, r.--raised, s.--scar or smooth, var.--varicose veins or varicocele, va.--vaccination scar, w.--wart. Combinations of the above abbreviations are permissible; such as p.s.1/2d.--pitted scar 1/2 inch in diameter; f.p.s. 1 x 1/2--flat pitted scar 1 inch long and 1/2 inch wide; r.h.m. 1/4d.--raised hairy mole 1/4 inch in diameter. Abbreviations shall not be used in description of tattoo marks since they are likely to be mistaken as signifying tattooed letters on the individual's body."

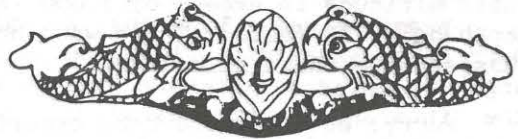
There should be no doubt in any medical officer's mind as to who is responsible for the final content of the SF 88. Even though reliable corpsmen are entrusted with completion and typing of major portions of this form, the medical officer is the person signing the document and certifying the recorded information.

This article constitutes a call to all medical officers and corpsmen for higher standards of excellence concerning descriptions of body marks and scars. Only in this way will valuable information be available for identification of the dead or injured when needed.

- LCDR R.L. Bendixen, MC, USN  
Naval Safety Center

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# SUBMARINE/ DIVING



## Latest Developments Concerning Exposure to Altitude Following Compressed Air Diving

Recently, a Marine reservist on his way to report for active duty had to be evacuated from a military transport aircraft after complaining of severe pain in his right shoulder, elbow and wrist. Less than 12 hours earlier, this man had made a "hard hat" compressed air dive with a civilian firm to 148 feet with a 48-minute bottom time. After the compressor was found to be pumping oil, he was apparently brought up for surface decompression on Table 1-26 of the U.S. Navy Diving Manual.<sup>1</sup> A few hours later the man was recompressed in a chamber to 30 feet on oxygen for a period of 58 minutes due to suspected high carbon monoxide exposure. He was apparently completely asymptomatic following treatment. Seven and one half hours later he boarded the aircraft and ascended to 19,000 feet with cabin pressure probably at 8,000 feet. Shortly thereafter, the pilot was asked to make an emergency landing and the diver, complaining of shoulder, elbow and wrist pain was taken to naval recompression facilities. The man was successfully treated on Table 6 of the U.S. Navy Diving Manual.

The problem of altitude decompression sickness following compressed air dives is not a new one. It has occurred subsequent to both "hard hat" and scuba dives and, while not frequent, may be expected to be seen more often in the future with the increasing popularity of underwater swimming and commercial flying. Airplane travel, however, is not the only causative factor. Four members of a scuba team were reported to have developed the bends while sightseeing in a tour bus 7,000 feet up a mountainside after participating in diving operations earlier in the day.<sup>2</sup> Although no deaths or permanent disability have yet been reported, the difficulties of reaching appropriate recompression facilities while engaging in air flight or other excursions to altitude may well result in future morbidity and mortality.

The most obvious way to prevent bends is to insure adequate surface interval between compressed air dives and altitude exposure. In 1960, Duffner, et al,<sup>3</sup> exposed divers to the compressed air equivalent of 90 feet of sea water for 30 minutes followed by standard U.S. Navy decompression. After a 45 minute surface interval, the divers were taken to a simulated altitude of 18,000 feet. Fifty-five percent of the 18 divers developed altitude decompression sickness within 60 minutes. The following year, based on this work, the Navy Bureau of Medicine and Surgery issued the following policy: "All personnel who have engaged, on a recreational or line of duty basis, in scuba or any other type of diving utilizing underwater breathing apparatus in excess of 30 feet (or who have been exposed to equivalent pressures in excess of this depth in a recompression chamber) should not fly to cabin altitude in excess of 18,000 feet (or make decompression chamber ascents above this altitude equivalent) within 12 hours following the termination of such



a dive or recompression descent."<sup>4</sup> Even more conservative guidelines were recommended as a result of USAF experience. One source has stated that no flying to cabin altitude in excess of 5,000 feet should take place after scuba diving to depth below 15 feet.<sup>5</sup> There was, however, no conclusive human experimentation to substantiate these guidelines.

Furry, et al,<sup>2</sup> conducted experiments in 1967 to determine the "bends threshold" of dogs. This threshold represented the maximum sea water pressure the dogs could sustain for seven hours and then be rapidly decompressed to surface pressure without incurring more than a 50% probability of developing bends. The dogs were then exposed to pressures for seven hours within one foot of their bends threshold which previous tests indicated would not produce symptoms within six hours after decompression to sea level. The surface decompression intervals were varied at one, three, six and 12 hours after completion of the dive. The animals were then exposed to 10,000 feet simulated altitude and observed for symptoms. The results showed that the incidence of bends was inversely related to the length of the surface interval. No symptoms occurred in the dogs after 12 hours' surface decompression. The authors felt that the results had valid application to man and reached the following conclusion: "All personnel who have engaged in compressed air diving to depths of 25 feet of water or its equivalent should not fly in other than pressurized commercial aircraft or to a cabin altitude greater than 8,000 feet or its equivalent within 12 hours following the termination of a compressed air dive."

Work involving extensive human experimentation did not appear until 1969. Edel, et al,<sup>6</sup> exposed divers to pressure-time profiles within the limits of the "no decompression" tables of the U.S. Navy Diving Manual. The various dives were planned to involve both limiting fast, intermediate and slow half-time tissues. A tissue half-time is defined as the time it takes for the concentration of a gas (in this case, nitrogen) to be changed to one-half or twice its original value. Since the various body tissues display differing rates of nitrogen exchange, it is convenient to refer to them by their individual half-time interval. The shorter, deeper dives specified the short half-time tissues as limiting, and the shallower, longer dives involved the long half-time tissues as limiting. Following surface intervals ranging from five minutes to five hours, the subjects were exposed to 8,000 feet and 16,000 feet simulated altitude. It was found that for all limiting half-time tissues except for the slowest (240, 360 minutes), a surface interval of two hours was adequate to insure against bends. These slow half-time tissues only become limiting, it was felt, in deep, working dives of long duration comparable to those of commercial divers. The authors felt justified in stating that "scuba divers who stay within the limits (depth-time) of the standard U.S. Navy 'no decompression dives' for a period not exceeding 12 hours will not develop decompression sickness if, after diving, they allow a minimum two-hour surface interval before flying in a pressurized commercial aircraft (8,000 feet cabin pressure). Divers who make dives beyond 'no decompression' limits should allow a surface interval of 24 hours before decompression to a commercial aircraft cabin altitude pressure if they are to avoid the risk of bends."

It is quite apparent that there are many differing opinions as to "safe interval." The parameters involved are extremely complex, consisting of not only time intervals and pressures but of breathing gasses and their mixture, physical activity involved in the dive, temperature of the water, weight of the diver, past history of bends and previous alcohol consumption. It was necessary, therefore, for



the U.S. Navy to arrive at a safe, simple rule which would cover most exigencies. This rule is of necessity quite conservative. OPNAVINST 3710.7E (General NATOPS) states that "Under normal circumstances, personnel shall not fly or perform low pressure chamber runs within 24 hours following scuba diving, compressed air dives or high pressure chamber runs. Under circumstances where an urgent operational requirement dictates, flying personnel may fly within 12 hours of scuba diving, providing no symptoms of aeroembolism develop following surfacing and the subject is examined by a flight surgeon."

The Navy policy may be thought by some, in light of experimental data, to be unnecessarily conservative. The private sport scuba diver might feel inclined to use, in some circumstances, surface intervals shorter than 24 hours before flying and might get away with it. Experimental work has indicated that in selected no decompression dives, a two-hour surface interval is adequate before commercial flight. It is our opinion, however, that the only certain way to avoid bends is to follow the Navy rule of 24-hour surface interval after any compressed air dive. Indeed, altitude decompression sickness has been reported in a sponge diver following a 12-hour surface interval.<sup>2</sup> No cases of bends have ever been heard of following a 24-hour wait. Conservatism is then indicated because of the many and sometimes unpredictable variables involved in producing the bends and the difficulties in obtaining treatment which may be encountered in air travel.

- LT Mark Belkin, MC, USNR  
Naval Safety Center

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## **Unexpected Headache**

Exiting an SSN through the forward escape trunk at the same time trash cans were being passed up, an ETN2 recently had a rather startling experience. Just as the ETN2 was coming up the ladder, a shipyard worker attempted to enter the trunk. A seaman on the ladder between the two men was jostled and dropped the trash can he was carrying onto the head of the man below him. The result was a two-inch scalp laceration.

The injured man broke a cardinal rule of submarine safety: Never stand under a hatchway while items are being transported through it.

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# Submarine Injuries-Fiscal Year 1970

During fiscal year 1970, the Naval Safety Center received 89 personnel injury reports from submarines.\* The majority (84) were incurred by military--four officers and 80 enlisted men. Civilians working directly for Department of Defense and for contractors accounted for three of the five remaining injuries. The remaining two persons injured were a harbor pilot, hurt while boarding a boat, and an unauthorized, inebriated visitor, who fell down a ladder. Analysis in this article is limited to the 84 military personnel injuries since control exercised by commanding officers over operations is normally limited to members of a boat's complement.

## Operations Injuries

Injuries occurred during two phases: operations and leave/liberty. One-third more injuries (53) occurred on duty status than during leave/liberty (31). Injuries ranged from minor, with no lost man-days charged, to major with 240 man-days charged to one accident alone. Total man-days required for recuperation of injuries was 1,253. Average man-days charged was 23.6. Ages ranged from 19 to 38 years. Mean age of those injured personnel whose ages were reported was 24.2 years. Ship-board experience was also reported for a little more than two-thirds of this group; its mean level was 5.0 years. In no case was presence of alcohol indicated although usage of a pain-reducing drug was implicated in one accident.

Strikes: The greatest number of injuries occurred as a result of personnel being struck by various objects. A total of 13 persons were injured when struck by objects ranging from hatches to a spinning grinder wheel. Two of the five injuries in which personnel were struck by doors and hatches occurred simply because of failure to secure hatches while working or standing in their immediate vicinity. Inattention, improper procedure and horseplay were factors in the other injuries.

Two injuries were sustained during mooring exercises when strains were taken and lines slipped and ran out, striking the line tenders. Their failure to recognize the rapidly increasing danger of the situations precluded movements to stand clear. Inadequacy of deck supervision was not indicated in the accident reports but may have been a contributing factor.

Five of the six injuries stemming from miscellaneous "strikes" were due to unrelated equipment failures involving torpedo handling and chainfall straps, a fuel oil cap retainer chain and grinder wheel. A need is indicated for thorough and continuing preventive maintenance programs in which equipment subject to unusual stress is periodically inspected. The final accident stemmed from lack of coordination between two men, one of whom was holding a rod for another to strike with a hammer.

Falls: Thirteen men were injured by falls; four were slightly injured when rapidly escaping air from a defective air bank valve blew them through a hatch. Failure to observe unguarded open hatches caused the injury of four others. Lack of familiarity with compartmental layout and distraction were underlying factors in the fall of a visiting medical officer during a conducted tour. Inattention was a factor in the remaining falls through hatches. Two sailors were injured by falls from ladders. One fainted after taking several pain-reducing tablets and the other

\* Includes injuries reported on OPNAV Form 5100/1, Accidental Injury/Death Report. Motor vehicle injuries, reported on Standard Form 91A, are not included.



ignored proper procedures and failed to use handrails while climbing to an upper level. The other falls occurred as a result of horseplay, collapse of temporary decking and failure to use a ladder while conducting overhead maintenance.

Burns: Eight men were injured by burns, six from electrical discharges and two from fire and steam. Although the electrical burns occurred under different circumstances, all but one reflected either lack of knowledge and supervision or improper procedures. Personnel were burned by arcing circuits and flashing leads. Injuries occurred as a result of a multimeter being incorrectly set, improper wiring of power leads, inadvertent circuit completion during electrical repair, improper cleaning procedures of main storage batteries and improper connection of a generator to a battery buss. One man was shocked when his hand contacted a cable that supposedly had been deenergized in a ship overhaul several years previously. Fortunately the injury was minor. The thermal injuries resulted from improper engine room procedures in which a fire flared because fuel injection pump control racks were not reconnected to control racks and an isolation steam valve was opened while blowing down a steam trap.

Toxic Exposure: Six cases of toxic exposure occurred when an electrical fire in a battery well resulted from an arcing circuit. The men in the immediate vicinity of the fire were overcome by fumes and smoke from burned mica-glass insulation. Injuries were slight and no lost man-days were charged.

Crushes: Six men were hurt from mashing or crushing type injuries. Two were injured while handling torpedoes which unexpectedly shifted against them; inattention was a factor in both cases. Lack of clearance as a design deficiency was cited in one case when a man's hand was mashed between the elevating periscope handle he was holding and the sharp edge of an overhead foot rest. Equipment failure accounted for one injury while lack of a protective shroud resulted in another. In the latter case, a man's foot was crushed by an actuated but unprotected plane yoke whose housing had been removed for repair. The final injury in this category occurred when a man lost his balance and his hand was mashed by the equipment he had been carrying.

Cuts: Cuts resulted in four injuries, all due to carelessness. The most severe injury occurred when a man who had been using a handrail as a substitute for a ladder jumped from the rail to the deck and caught his ring on the sharp upper edge of a switch box, resulting in severe lacerations of his finger. Two injuries occurred when the individuals' hands contacted rough edges of a trash can and trash compactor. The last injury occurred while a meat slicer was being operated. Inattention appears to be an underlying factor in each of these incidents.

Strains: The last category to be considered is that in which injuries resulted from people attempting, in two cases, to handle heavy loads. One man sustained a hernia while carrying a heavy load and the other strained his back lifting machinery. The third accident in this category occurred when a man who had very recently been injured in an automobile accident strained his shoulder muscles while simply reaching for his ship's brow rail.

#### Operations Analysis

Place of Occurrence: The following table (Figure 1) identifies the different shipboard areas in which three or more injuries occurred. Type of injury,

# INJURIES AND MAN-DAYS LOST BY PLACE OF OCCURRENCE\*

INJURY	PLACE						Totals
	Battery Well	Deck	Engine Room	Gunnery Space	Machinery Room		
Burn	2 / 7	4 / 50	1 / 10	6 / 90	2 / 13	6 / 57	
Crush	1 / 3	1 / 40	1 / 5	2 / 20	1 / 13	2 / 13	
Cut	2 / 74	4 / 103	1 / 1	6 / 90	1 / 40	13 / 272	
Fall	2 / 20	5 / 266	1 / 4	1 / 1	2 / 8	2 / 20	
Strain	5 / 266	2 / 4	1 / 1	1 / 1	8 / 271	5 / 266	
Struck	6 / 0	10 / 363	11 / 197	3 / 16	6 / 90	38 / 673	
Toxic Exposure	8 / 7	10 / 363	11 / 197	3 / 16	6 / 90	38 / 673	
Totals	8 / 7	10 / 363	11 / 197	3 / 16	6 / 90	38 / 673	

\*Entries above diagonal — No. of Injuries

Entries below diagonal — Man-days Lost

Figure 1

frequency of occurrence and resultant lost man-days are also indicated. As would be expected, the greatest frequency of accidental injuries clustered around those areas in which there is typically a great deal of activity and in which hazard exposure is greatest. Injuries most frequently occurred in engine rooms and eight of those 11 resulted from burns and falls. Deck injuries were the second most frequent and exactly half of them occurred when personnel were struck by various objects. The large number of lost man-days associated with deck injuries indicates such injuries tend to be more severe than those in other areas.

Two injuries each occurred in the galley and sail. Areas in which only one injury occurred include the bridge, a ladder, passageway, periscope stand, reactor compartment, shaft alley, shop and shower. Total lost man-days from injuries in these low-frequency injury areas is 361. Three other injuries resulted in 76 lost man-days but the areas in which they occurred were unreported.

Injuries by Pay Grade: Injuries followed a fairly predictable pattern when examined by pay grade. No operational injuries occurred among recruits and apprentices, possibly because their performance is so closely monitored by supervisory personnel. Five seamen and firemen were injured as a likely result of increased exposure to hazards and decreased supervision. Nowhere is this more evident than among the third class petty officers. The great increase in accidental injuries depicted in Figure 2 occurs at a time in their careers when they are still very young and immature and yet are assigned full responsibility for completion of many tasks. Experience tempered by maturity of judgement is thought to be the prime factor contributing to the improved injury record of second and first class petty officers. Senior petty officers have far fewer accidents than their juniors since they function in supervisory capacities where hazard exposure is minimized. Similar reasoning applies to the injuries of officer personnel, only two of whom were injured.

ON-DUTY INJURY FREQUENCY BY PAY GRADE  
(12 injuries not shown because pay grades not reported)

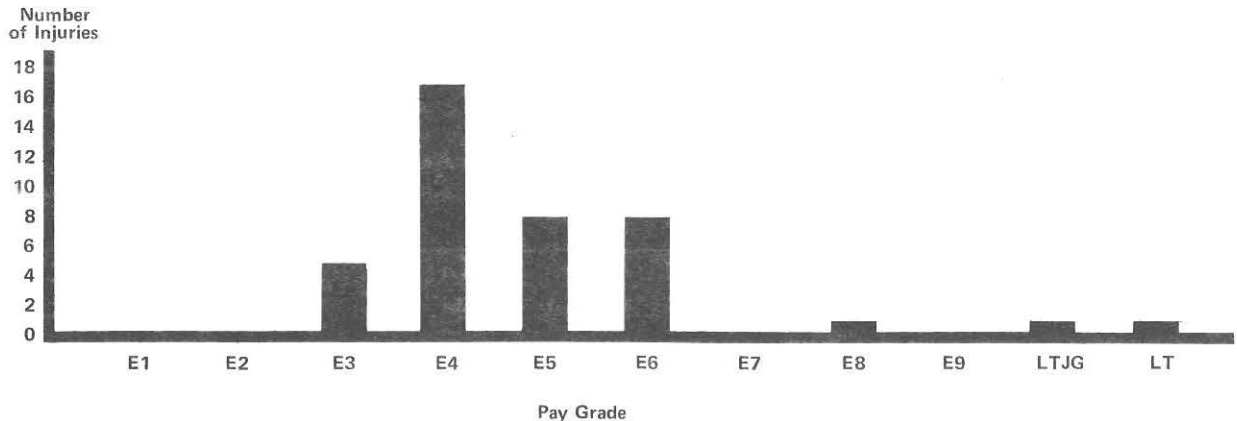


Figure 2

Leave/Liberty Injuries

Approximately one-third of all injuries (31) occurred during leave/liberty status, accounting for 13,097 man-days lost. Two of these accidents resulted in fatalities (one man was accidentally shot and another drowned in rough surf). Twelve-thousand man-days were charged to these two accidents alone. The remaining leave/liberty status injuries ranged in severity from minor to major and averaged 37.5 lost man-days per accident.

Sports/Recreation: The greatest number of injuries were sustained by enlisted men engaged in organized sports and other forms of active recreation. Such injuries typically occurred as a result of violent twisting motions, falls and, in football, from bruising blows from blocks thrown by opponents. Fourteen men were injured in this manner. Injuries, which were generally limited to simple sprains and fractures from abrupt person-to-person contact, accounted for 557 lost man-days.

Falls: Six men were injured from falls and three of them were under the influence of alcohol at the time of injury. Their falls apparently stemmed from lack of coordination and reduced reaction capability. Two men fell down stairs while another man, who was working on a ladder, fell to the ground when the ladder slipped. Total injuries resulted in 133 lost man-days.

Fights/Assaults: Five men were injured during separate fights and assaults. Total lost time was 141 man-days. One of these men was under the influence of alcohol. This category of injuries may be under-reported since fear of reprimand by authorities could cause some, if injured, to seek private medical treatment or to self-medicate and avoid reporting such injuries. The possibility also exists that the injury could be attributed to some other causation and, therefore, be misreported.



Cuts: The last category of injuries to be considered is that which involved cuts. Four men, one of whom had been drinking, were injured in this manner. Two men received cut hands and wrists when they tripped and fell into glass door panes. While forcing a bottle into a cooler of ice, one man was injured when the bottle broke. Finally, a man was treated for a cut abdomen which he stated resulted from falling on a paring knife. Cutting injuries resulted in 266 lost man-days.

Ages of the men injured during off-duty status ranged between 18 and 36 and, when averaged, resulted in a mean of 24.1 years. As many injuries occurred at night as did during the day. Weather conditions do not appear to have been a significant factor.

#### Summary

The picture which emerges of accidental injuries within the submarine force during FY 1970 is one of low accident frequency with only two deaths, both occurring in off-duty status. Discounting the 12,000 lost man-days charged to the two deaths, only 2,350 lost man-days were recorded. Off-duty injuries occurred primarily as a result of sports activity and falls. Alcohol was a contributing factor in five of the 31 cases of off-duty injury. In contrast, operations injuries predominantly resulted from falls and, secondly, from personnel being struck by objects. Alcohol was not indicated as a factor in operations injuries but usage of a pain-reducing drug was implicated in one case. Off-duty injuries most frequently occurred on athletic fields during sports activity and secondly, in private homes. Injuries sustained during operations most often occurred in the engine room and on deck. Additional analysis is restricted by the failure of many investigators to properly complete the accidental injury reporting form. Many important factors such as an individual's designation as a military man or Civil Service employee, age, naval experience, duty status and man-days charged for recuperation are frequently not completed. In addition, the space provided for a narrative discussion by the investigating officer is often ignored and much important information is thus lost.

If the submarine service is to profit from its past mistakes by being able to study accidents in detail and to alert supervisory personnel to underlying causes and potential trends, everyone's cooperation is needed. Help us to help you. File an accidental injury reporting form promptly whenever it is required and complete it in detail so that those analysts who were not privileged to interview the injured person or investigate the accident will know exactly how the accident occurred and the circumstances in which it developed. This information may help prevent a similar accident from occurring-- perhaps even to you.

- Michael Brownley  
Naval Safety Center

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## ***Identification of the Emotionally Unstable Aviator***

The pilot-error accident is an indicator of a poor match between man, machine and environment. The matching of man with aircraft is a function of design, training and personal factors. Poor human engineering design, poor handling qualities, inadequate training and just plain bad luck all take their toll. There are mishaps, however, that appear to the analyst as seemingly intentional. If not suicidal intent, then certainly a willingness to "tempt fate" is indicated. This recklessness may be a human reaction to boredom or it may be the manifestation of an inadequate personality.

Recently a teen-age boy killed himself while playing "Russian roulette." This was not a suicidal gesture but was apparently a reaction to boredom. Human beings seek excitement and in order to avoid boredom and seek a stimulating environment we frequently court danger by engaging in hazardous pastimes or occupations. Flying is both of these, but when the reasonable calculated risks of a job or sport are exceeded with no military, professional or sporting objective other than "showing off," behavioral pathology is indicated.

Mishaps on file at the Naval Safety Center illustrate this pathological courting of danger. Case 1: After a series of NATOPS violations, a 2,000 hour LCDR with numerous personal problems and marital difficulties was killed on ejection from an aircraft because he wasn't strapped into the seat. Suicide was ruled out. Case 2: A naval aviator put on an "air show" involving unauthorized maneuvers close to the ground and was killed in the process. A diary left by the pilot indicated an emotionally unstable personality. Case 3: A student naval aviator killed himself doing a slow roll off the catapult after boasting to his friends that he would try it. He had been involved in an indecent exposure incident two months prior to the mishap. The common denominator in all three cases--impulsiveness.

The Safety Center has often been asked to identify the so-called "accident-prone" aviator. The problem was discussed in BESNL 3-70, "Behavioral Science and Accident Prevention," pp. 12-15. We noted in this article that the problem of accident liability must first be resolved through the construction of a hazard-exposure index. Then we can set a criterion for the identification of the accident-prone individual based on that individual's probabilities of having an accident as compared to his actual accident record. In other words, being involved in multiple accidents is not necessarily a good criterion for identifying accident-proneness.

Factor analyses of various personality traits of aviators have been attempted but none have yielded stable predictors of human-error accidents. Statistically, there are not enough "accident-prone" individuals in our naval aviator population,

after selection and training weeds them out, to be significant. Ideographic rather than nomothetic methods (focusing on the individual case rather than on groups) must be employed in order to identify them.

What criteria can be used for the identification of the emotionally unstable aviator who is more likely than average to be involved in human error accidents? Where do we draw the line between the tiger and the pussycat and still have a tiger who is not an accident looking for a place to happen? First we must identify the ideal aviator in order to compare and weed out the undesirable. We can look to our older, more mature aviators who have survived a career with no more than their share of mishaps. Speaking in evolutionary terms, these old pilots have evolved through the survival of the fittest and so have adapted to their environment in order to survive. This adaptability plays a significant role. Let's look at some of the other desirable traits attributable to these pilots.

The ideal naval aviator has a strong affectual system with close family ties but strives for autonomy in his life. During the process of socialization in childhood he introjected those values that are held in esteem by our culture (industriousness, morality, etc.) Identification with an ideal "father figure" allowed him to develop a strong but not overpowering "superego." His ego is secure enough that he doesn't have to prove his masculinity to himself and he doesn't overcompensate for feelings of inferiority. He channelizes his aggression into useful paths, frequently testing the limits of his capabilities, but he is realistic and knows his own limitations. He gets his "kicks" from flying and likes his job, finding it a stimulating and challenging career. Finally he is mature and stable emotionally, forming lasting friendships with other human beings.

This must be the basis for evaluating and selecting career naval aviators from the psychological standpoint. Too often we read an endorsement on an accident report which says..."LT \_\_\_\_\_ was an outstanding aviator; I simply can't understand his doing something so stupid." Skill is admittedly a large part of the flying game, but skill alone is not enough. An analysis of one case history, perhaps an extreme example, will help to prove the point.

A student pilot slow-rolled his jet after a cat shot. He was a skillful pilot to be sure but his impulsivity caught up with him. The night before the accident he went to one bar and downed a pitcher of beer. He left there and went to another bar and drank a half pitcher of beer and got into a fight over a woman. During the fight he was hit on the head with a blackjack. The blow didn't stop him, he became more violent and mad to the point of being irrational, but this was a normal reaction for him according to his companions. He didn't get to bed until 0200. He talked and boasted that he would do an aileron roll after cleaning up off the catapult on his final qualifying carrier landing the next day. He did just that only he didn't quite make it.

Two months prior to the accident, this student had had a student pilot disposition board for unofficer-like qualities. The board was called following an incident reflecting immaturity, impulsivity and a lack of a sense of responsibility. In his own words: "While riding with cadet X on a rural road, we decreased our speed to allow a pickup truck to pass. The truck did not pass and a dare was made to 'moon' it. Being a fraternity stunt, 'moonning' is not a case of a sexual deviate running around exposed but rather a defiant gesture of dropping the trousers and bending over which I did not interpret as carrying such serious connotations as have since been explained to me. The gravity of the situation has



since been greatly enlarged to me and I now realize I was acting with poor judgment, based on ignorance concerning the seriousness of what I was doing. I have called the lady offended (and her husband) and offered to make it up to them and show my good faith in any way they see fit. I have a strong desire to continue in the flight program and know that if I am allowed to continue, I will reflect nothing but credit on the military profession in the future."

The student's C.O. had this to say about the incident: "\_\_\_\_\_'s action was in the form of a thoughtless prank and not that of a deviate. It indicated a strong lack of responsibility and thoughtlessness. I have interviewed him and find him to be genuinely contrite (emphasis author's) over his behavior. His previous conduct while attached to this command has been above reproach. He is highly motivated to become an officer and aviator. He realizes the seriousness of his misconduct and is sincere in his desire to continue the flight program and become worthy of a commission...It is recommended that he be retained in the program under probationary status."

The student control officer said, "His officer-like qualities are evaluated as unsatisfactory," and went on to say oddly enough, "His present attitude indicates a strong possibility that he does possess the qualities needed to become an excellent officer."

These statements are mentioned only to emphasize the following evaluation of a Navy psychiatrist: "...He apparently possessed an uncanny ability to talk himself out of trouble and make a good personal impression on his superiors. It would seem that sufficient historical information is available to warrant a diagnosis of antisocial reaction. Such people are frequently callous and hedonistic, showing marked emotional immaturity, with lack of a sense of responsibility, lack of judgment and an ability to rationalize their behavior so that it appears warranted, reasonable and justified. This term includes cases previously classified as psychopathic personality. Such individuals make very poor military aviators today, in contrast to the period of WWI and (to a lesser extent) WWII."

The psychopathic personality as described by Robert W. White in his book, The Abnormal Personality is impulsive, immature, shallow of affect and fails to learn from experience. He cannot accept things as they are, is unable to fit in well but leads an individualistic existence. At first he may appear to be very charming; when he gets into trouble his contriteness causes his superiors to overlook his aberrant behavior but as he grows older and doesn't mature in judgment his attraction fades. He follows no consistent life plan unless it be one of failure. He seems incapable of real love and attachment and is indifferent to the feelings of others. According to White, "Although the patient outwardly presents a convincing mask of sanity and mimicry of human life he has lost contact with the deeper emotional accompaniments of experience and with its purposiveness."

How do we identify such individuals? The following comments on the case from the commanding officer, Naval Aerospace Medical Institute, are pertinent: "(Comment has been requested) on the feasibility of developing a test using psychological parameters that would provide commanding officers with a probability or percentile indicating a 'rashness factor'...the absolute identification of all applicants with psychiatric abnormalities could be accomplished only by extensive psychiatric evaluation of each individual, a highly impractical procedure in terms of limitations of time, staff and yield of significant findings."

"\_\_\_\_\_ clearly demonstrated the traits of a psychopathic personality. Such individuals are, fortunately, very rare among flight students today. His pre-flight peer rating of 31 indicated that his classmates considered him to be in the bottom three percent of all flight students in his potentialities as an officer and a pilot. In a Special Report distributed to the Training Command in 1958, it was shown that in two different years' inputs of students, men who received peer ratings of 34 or less had attrition rates of 61 percent and 79 percent. It was recommended that unless a student receiving such a rating encountered some kind of trouble he should be allowed to continue, but that if he met any kind of difficulty at any stage, whether this be in academic, flight or disciplinary (sic), he should be dropped."

It has been shown that the best predictor of successful naval aviators is a high peer rating. Indeed in the other two cases mentioned in this article, although both aviators were good pilots, they were held in very low esteem by their peers. In other words, the people who fly with an individual know him best. Commanding officers must take a realistic and hard-nosed position with regard to evaluating aviators in their commands. They must not hesitate in convening pilot disposition boards, consulting with their flight surgeons, and, if necessary, have the Naval Aerospace Medical Institute do a psychiatric evaluation of individuals whose personal lives are in continual turmoil.

Don't ask us at the Naval Safety Center to pick out the pilot who's going to have the next accident. He is among you and you know him. It is your responsibility to pick him out and get rid of him before he hurts himself and others.

- Robert A. Alkov, Ph.D.  
Naval Safety Center

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## **Steel Toe Safety Shoe Minimizes Foot Injury**

VA-155 recently reported a safety shoe save which demonstrates the foot protection provided by steel toes. A main landing gear of an A-7B rolled over a plane captain's foot while he was helping to spot the aircraft on the hot spot. His injury was minor, a broken big toe. With the A-7 weighing approximately 24,000 pounds at the time, the safety officer said, it is obvious that the injury without the steel toe shoe would have been extensive.

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## **Dual Garters**

There appears to be some confusion about proper placement of dual garters incorporated with leg restraints on some Martin-Baker ejection systems. Suggested positions vary from ankle to calf to just below the knee. In aircraft utilizing the dual garters (F-8, F-4 at this time), correct placement is shown in the aircraft NATOPS. Because improper positioning of leg garters can result in flailing or rebound injuries, all ejection seat training instructors should be familiar with correct placement of garters and emphasize the necessity for pilots and crewmen complying with aircraft NATOPS regarding correct positioning.

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# Causes and Symptoms of Fatigue in Aircrewmembers

Fatigue is a subject of concern to the entire aviation community. Fatigue degrades performance--tired aircrewmembers cannot carry out missions as reliably and as accurately as they should. Safety of flight is reduced--the reserve of task performance disappears and the stage is set for increased likelihood of errors of judgment or action at a time when the crew is least able to handle emergencies precipitated by these errors.

The concept of fatigue is multidimensional, covering the areas of physiological impairment, decrement in work output and changes in attitude and motivation toward a task. A common misconception is to view fatigue as an all-or-none phenomenon; instead, fatigue begins when the individual starts a task and increases with continued performance. At some stage, varying with the individual and the task, fatigue may become sufficiently severe to produce noticeable decreases in ability to perform. Long before that point, however, the impact of fatigue has been felt through a decreased reserve capacity and an increased chance of an unpredictable mistake on a well-learned task.

The onset of fatigue is accompanied by numerous changes in the behavior of an individual, some of which may occur quite early in task performance. These changes might be called the "symptoms" of fatigue. Certain conditions induce fatigue, modify the rate of its onset and increase or reduce its impact. These we might call the "causes" of fatigue. Research studies have provided a collection of such causes and symptoms in the flight situation. Some of these are listed below. The lists do not contain all possible factors, nor are items entirely independent of one another, but each plays a role in the development of fatigue.

## Causes

Workload and working conditions  
Time on task and work/rest cycles  
Hours of sleep and rest  
Diurnal variations  
Turn-around time (debrief to brief)  
Night flights  
Crossing multiple time zones  
Time into flight  
Frustrations from work or family  
Stress of mission

Prolonged and repeated flights  
Irregular flight schedules  
Inadequate support services  
Lack of free time for recreation  
Hours in standby status  
Aircraft environment  
Physical illness  
Alcohol/drugs  
Age of crewman  
Boredom/monotony

## Symptoms

1. There is a deterioration in timing of movements involved for a larger sequence.
2. Pilots are increasingly willing to accept lower standards of accuracy and performance.
3. A state of irritability and lack of patience are produced in the individual.
4. A fatigued pilot tends to split a complicated task into its component parts.
5. Normally, pilots tend to integrate the instrument panel as a whole. If the scanning pattern breaks down, the pilot pays more and more attention to individual components or panel instruments.
6. Pilots become more forgetful, with a tendency to neglect relevant cues and to pay no attention to side instruments (gear indications, fuel quantity, and temperature and pressure instruments).
7. Pilots overcontrol the aircraft with a tendency to be rough on flight controls.
8. Pilots project their mistakes on the aircraft.



9. Pilots become more aware of physical discomforts and complain of seating discomfort, heavy helmet, excessive warmth and cramped quarters.
10. There is a growing inability to interpret kinesthetic sensations correctly (loss of seat of the pants flying).
11. Fatigued pilots make many mistakes on simple well-learned tasks. This tendency is particularly strong on landing. There are increases in problems of glide slope control and airspeed during landing approaches.
12. Subjective reports of fatigued pilots become unreliable as to what has occurred.

#### Using the Lists

A recent Patrol ASW Development Group report used the causes and symptoms described above to analyze the role of fatigue in U.S. Navy P-3 mishaps.\* From 1962 through 1969 there were 16 major P-3 accidents (excluding hostile action). Of these 16, fatigue was noted as contributory in eight. Most frequently involved causes were: 1) Lack of sleep, 2) instrument flights, 3) diurnal variations, 4) night flights and 5) workload. Most frequently involved symptoms were: 1) Splitting a task into component parts, 2) fixation, 3) forgetfulness and 4) breakdown in scan. Although the study dealt with patrol aviation, the principles remain the same for other aircraft and other types of operations.

To demonstrate how the lists above might have been used before the accident to detect the development of a fatigued aircrew, one of the P-3 accidents is discussed below. It illustrates a number of the causes and symptoms seen on the lists.

#### Fatigue in an Accident

The operational tempo of flying for this period had been close to the limit possible for continuous operation. This particular crew averaged over 100 hours of flight time per month for the preceding 3 months. During this period a rate of operations had been established that could be accepted, due to an actual wartime situation. However, in addition to the heavy tempo of operational flying, there have been ASW training periods available. In order to peak up the crew's ASW readiness, all submarine services were flown in addition to all operational commitments. The stage was set for discontent.

The plane commander had flown a patrol training flight the night prior to the accident during the same hours, midnight to 0600, and with the same exercise submarine. This previous flight was the first flight he had flown in 11 days.

Upon returning from this previous ASW flight (at 0600), the crew wasn't scheduled for another flight until 0800 the following day. They went to bed under this assumption. A schedule change was made to allow another crew to have the daylight period for a more difficult qualification exercise. This change moved this crew up to another midnight takeoff. There were some bitter remarks made by several of the crew's officers concerning the change, particularly when in their opinion they didn't need sub time.

Prior to and during the ASW exercise, the plane commander was determined to

\* "A Survey of Major P-3 Accidents, with Special Emphasis on Fatigue," Patrol ASW Development Group Report No. 40, 1971, by LT Richard Shannon, MSC, USN, and LT Norman E. Lane, MSC, USN.

use a bank angle of 27° in order to recross reference points. This is considered a confusion factor. The initial and continuous reference to 27° indicates a pre-occupation with a particular maneuver. Where the confusion would arise is that the maneuver was not applicable to the tactic, yet the PPC initiated it twice. On both occasions the PPC caught the error, but one of the times it was used within a minute of the crash.

While conducting low altitude ASW localization, the aircraft flew into the water. Aircraft impacted in a slightly nose high attitude at a low rate of descent. Four survivors were thrown clear, including the plane commander, and were rescued by the submarine. Investigation disclosed that the pilot was maneuvering the aircraft in a pattern using smokelights as a visual reference. Just prior to impact the copilot and flight engineer were engaged in adjusting tactical equipment. Aircraft lost 650 feet undetected by any of the flight crew.

The aircraft descended from a stated 650 feet into the water in an apparent 1 G maneuver. How the aircraft descended 650 feet without the pilot, copilot or engineer noting the descent or radar altimeter red warning light is the primary question. The most probable cause was pilot inattention or fixation outside the cockpit. It is believed the pilot's failure to note his decreasing altitude was due to a poor instrument/visual reference scan pattern, and an undue reliance on secondary altitude monitors such as the copilot, flight engineer and altitude warning light.

Just seconds from the crash, the plane commander's attention was fixed outside the cockpit, referencing his intended flight path on smoke lights in the water. The copilot was talking to the TACCO over the ICS telling him there was no smoke on #5, that the OTPI wasn't homing and trying to decide how they could find it. The engineer was setting the sonobuoy channel number for the OTPI.

This accident involves, among other things, such causes as: 1) Diurnal variations, lack of sleep, poor rest, 2) night instrument flights, 3) prolonged and repeated flights and 4) low morale and low motivation resulting from work frustration. The symptoms of fatigue can be seen as: 1) Misinterpreting kinesthetic sensations, 2) task fixation and breakdown of scan, 3) deterioration of timing within maneuver, 4) acceptance of lower performance and 5) forgetfulness and memory lapses.

### Conclusions

The accident above shows the use of the lists with hindsight. Their value lies in usage with foresight, before the mishaps can occur. All commanders and aircrewmen should be aware of the symptoms and causes of fatigue. This awareness on the part of the pilot and his superiors can make them more sensitive to conditions which can produce a high probability period for an accident, and might, in itself, help to prevent an accident. Many of the causes of fatigue are controllable and many of the symptoms recognizable. Individuals who are more knowledgeable about fatigue will be better able to detect it and avoid its pitfalls.

— LT Norman E. Lane, MSC, USN  
Naval Safety Center

LT Richard Shannon, MSC, USN  
Human Factors Team  
Patrol ASW Development Group  
Commander, Fleet Air Wings,  
U.S. Atlantic Fleet

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## Sixth Annual Physiologists Meeting

The following is a brief of items of interest discussed at the sixth annual meeting of naval aerospace physiologists:

Training devices: A new generation of training devices will be introduced for use in Aerospace Physiology Training Units (APTU's). Pneumatic propulsion will replace the present ordnance propulsion in ejection seat trainers. This improvement will not only reduce cost but will immensely increase the safety of operation. A new low pressure chamber is planned which will include closed circuit television monitoring for increased safety.

MEW: An in-house project is underway to develop a Minimum Envelope and Weight (MEW) ejection seat. The Aerospace Crew Equipment Department (ACED) of the Naval Air Development Center (NAVAIRDEVCCN) Warminster, Pa. is tasked with producing the MEW. An ejection system weighing less than 100 pounds, requiring minimum maintenance and adaptable to new generation aircraft is the ultimate goal. ACED will require a more stringent testing program than previous systems have undergone.

Aviator personal and survival equipment: It appears that nomex will continue to be the best available fire retardant fabric although several other fabrics are under study by NAVAIRSYSCOM. A new coverall assembly for exposure protection will be produced for fleet use. It will consist of 1/8 inch of neoprene with an outer shell of nomex (4.2-ounce twill) and will be available in 18 sizes. A new coverall flying summer (flight suit) will be produced for fleet evaluation. The suit will be a nomex fabric but will be sage green in color.

NAVAIRSYSCOM has released an Aircrew Systems Change which makes the dual visor an optional item for VF aircrews (ACSC 209). The HGU-20P (AOH-1) helmet with minor modification updates will be purchased in a lot of 485 for fleet introduction. NAVAIRSYSCOM is funding development of a helmet sight AN/AVG-4 target acquisition. This helmet will provide pilots with the capability of producing a radar lock-on, utilizing visual sighting.

Further information regarding the status of aviator personal and survival equipment can be provided by NAVAIRSYSCOM (AIR-531).

Aerospace physiology training program: The new aerospace physiology training syllabus became effective on 1 November 1970. From that date, all APTU's will be responsible for following a minimum instructional syllabus and low pressure chamber operation profile. The standard syllabus has been approved by the Chief of Naval Operations and minimum requirements will be stated in General NATOPS (OPNAV 3710.7 series). Included in the standardized syllabus is a water survival training program which will be in effect for those APTU's conducting water survival and is proposed as a Navy-wide standardized syllabus. Despite a small complement of officers and men, nearly 64,000 aviation personnel were trained by the aerospace physiology training program in fiscal year 1970.

Non-auditory communications: One of many research projects underway at NAVAIRDEVCCN is the development of a non-auditory communications system. This device transmits sound through electronic vibration vice sound waves. Transmission occurs by placing a metallic microphone to skin tissue in most facial areas. The vibration is routed through an electrical transmitter and amplifier to a

loudspeaker. Because no sound waves are involved, the microphone can be used in high noise environments with almost no masking of transmission. (In a demonstration the project engineer was able to whisper in 125db chamber and be heard through an external speaker.) In addition, any metal which will transmit vibration to the auditory canal can be used as a "headset." (In the demonstration, simple metal washers were used.)

- LT W.F. Cunningham, MSC, USN  
Naval Safety Center

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## **Aviation Personal and Survival Equipment Team (APSET)**

In your dealings with the Safety Center you have probably been given information, either by word of mouth or in print, which referred to an organization called APSET. APSET, which means Aviation Personal and Survival Equipment Team, was formally set up a few years ago to advise and assist the Deputy Chief of Naval Operations (AIR) in establishing requirements for and providing the operating forces with new aviation life support equipment and modifying or withdrawing existing equipment from use. Team membership consists of representatives from just about every major command which has anything to do with aviation personal and survival equipment.

APSET reviews and evaluates naval and Marine Corps reports, as well as other sources of information, which pertain to our equipment and makes recommendations based on the findings. Problem areas are identified and corrective action is recommended. Policy guidance to activities involved in development, procurement, distribution, installation, maintenance and utilization of personal and survival equipment is contemplated.

After the Team has met (a meeting is held about every six months), proceedings and recommendations are submitted to DCNO (AIR) for review and approval. The approved recommendations are then sent to the organization(s) responsible for action. You see the results in new equipment or changes to old equipment or perhaps a new or revised policy on its use.

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## **Flight Deck Helmet Protects**

When the holdback ring broke just before catapult launch of a T-2B, the port wing strut of the moving aircraft struck a catapult crewman in the head as he was getting clear. He was knocked unconscious. The ship's flight surgeon rendered first aid on the spot. After 24 hours in sick bay, the crewman was released to full duty. The investigating flight surgeon reports that the crewman probably owes his life to the fact that he was wearing his flight deck helmet as required.

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# SHORE ACTIVITY



## **Coast Guard Suggestions for Recreational Motorboat Safety**

1. Gasoline vapors are explosive and being heavier than air will settle in the lower parts of a boat. All doors, hatches and ports should be closed while fueling, galley fires and pilot lights extinguished, smoking strictly prohibited, and the filling nozzle kept in contact with the fill pipe to prevent static spark. Avoid spilling. Do not use gasoline stoves, heaters or lights on board. Whenever possible, portable tanks should be fueled out of the boat.
2. After fueling, thoroughly ventilate all compartments and check the machinery and fuel tank areas for fumes before attempting to start the motor. Remember that the electrical ignition and starting system could supply the ignition to any accumulation of explosive vapors. Take time to be safe. Keep fuel lines tight and bilges always clean. Check your fuel supply system; see that the tanks are vented outboard and that the fill pipes are located outboard of coaming and extend to near the bottom of the tank. Have an adequate filter on the fuel line.
3. Do not overload. Maintain adequate freeboard at all times; consider the sea conditions, the duration of the trip, the predicted weather and the experience of the operator.
4. Keep an alert lookout. Serious accidents have resulted from failure in this respect.
5. Be especially careful when operating in any area where swimmers might be. They are often difficult to see.
6. Watch your wake. It might capsize a small craft; it can damage boats or property along the shore. You are responsible. Pass through anchorages only at minimum speed.
7. Keep firefighting and lifesaving equipment in good condition and readily available at all times.
8. Obey the Rules of the Road. Neglect of this is the greatest single cause of collision.
9. Always have children wear lifesaving devices. Always check those intended for young children for fit and performance in the water on each individual child. Never hesitate to have "all hands" wear lifesaving devices whenever circumstances cause the slightest doubt of safety.



10. Know your fuel tank capacity and cruising radius. If necessary to carry additional gasoline do so only in proper containers and take special precautions to prevent the accumulation of such vapor in confined spaces.
11. If you capsize, remember that if the boat continues to float it is usually best to remain with it--you are more easily located by search plane or boat.
12. Good housekeeping is even more important afloat than ashore. Cleanliness diminishes the probability of fire.
13. Know the meanings of the buoys. Never moor to one--it is a Federal offense.
14. Consider what action you would take under various emergency conditions--man overboard, fog, fire, a stove-in plank or other bad leak, motor breakdown, bad storm or collision.
15. Have an adequate anchor and sufficient line to assure good holding in a blow (at least six times depth of water).
16. Boat hooks are not required equipment but they are valuable when mooring or when needed to retrieve pets, preservers (and people) "over the side."
17. Know the various distress signals. A recognized distress signal used on small boats is to slowly and repeatedly raise and lower the arms outstretched to each side.
18. Storm signals are for your information and safety. Learn them and be guided accordingly.
19. Water ski only when you are well clear of all other boats, bathers and obstructions and there are two persons in the boat to maintain a proper lookout.
20. Falls are the greatest cause of injury both afloat and ashore. Eliminate tripping hazards where possible, make conspicuous those which must remain, have adequate grabrails and require proper footwear to be used on board.
21. Always have up-to-date chart (or charts) of your area on board.
22. Always instruct at least one other person on board of the rudiments of boat handling in case you are disabled--or fall overboard.
23. Keep electrical equipment and wiring in good condition. No knife switches or other arcing devices should be in fuel or engine compartments. Allow ample ventilation around batteries.
24. Before departing on a boat trip, you should advise a responsible friend or relative about where you intend to cruise. Be sure that the person has a good description of your boat. Keep him advised of any changes in your cruise plans. By doing these things, your friend or relative will be able to tell the Coast Guard where to search for you and what type of boat to look for if you fail to return. Be sure to advise the same person when you arrive so as to prevent any false alarms about your safety.

25. Do not test fire extinguishers by squirting small amounts of the agent. The extinguisher might not work when needed. Always follow approved instructions in checking fire extinguishers.

26. A special flag hoist (red flag with white diagonal) flown from boat or buoy means skindiving operations. Approach the area with caution and stay clear at least 25 yards.

- U.S. Coast Guard

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## **Old Habit Pattern Leads to Gas Stove Accident**

(The following account of a home accident could be used as a safety item in station plans of the day.)

An AE3 had a close call a few months ago when he forgot that the oven in the gas stove in his new apartment did not have a pilot light. The stove in the apartment he had just moved from had an automatic pilot light to light the oven when the gas was turned on.

Following his previous habit pattern, he put a steak under the broiler and turned on the gas. Later, when his wife asked him to look at the steak he opened the oven door and discovered he had not lit the gas. Without thinking, he got a match, leaned over and struck it. The accumulated gas ignited and flames belched from the oven. He received first and second degree burns of the face. He was treated in the emergency room of the local naval hospital and was only away from the job two days. The accident could have been much worse.

Investigating safety personnel warn:

. Strike your match before you turn on the gas in any gas heating/cooking equipment.

. If gas accumulates and does not ignite, ventilate the space by opening doors and windows before you try to relight.

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## **Non-Skid Can Help Prevent Slips and Falls**

A back injury necessitating 40 days' lost time resulted when an enlisted man, wearing a pair of shower shoes, slipped on the wet concrete deck of a barracks washroom at a naval station...During heavy seas a man aboard a destroyer slipped on the wet and worn steps of a metal ladder and fell several feet to the deck below. His right heel bone was fractured putting him out of commission for from six months to a year.

In both instances, reviewing officials recommended that non-skid be installed to prevent future accidents of this kind. Non-skid materials available in the Navy supply system are Haze grey flight deck compound, non-slip (stock number 5610-857-4393) and Deck covering, non-slip, 2' x 6" (stock number 7220-205-0389).

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## **Alcohol Withdrawal Syndrome and Shipboard Safety**

The problem of drug abuse has recently received wide attention both in and out of the military service. As the abuse of marihuana, hallucinatory drugs, opiates and amphetamines by soldiers and sailors seems to increase, speculation arises as to ramifications involving not only personal health but safety hazard and overall combat effectiveness. Within the Navy great efforts at drug education are being made as well as efforts to identify drug abusers and peddlers. We must, however, take care not to ignore another drug which, although legal, is the most consistently abused of them all: alcohol. This drug, like heroin and barbiturates, is physically addicting, having a recognized withdrawal syndrome. Alcohol, therefore, not only imperils the safety of the acutely intoxicated in port, but due to withdrawal symptoms can impede a man's performance and jeopardize safety at sea. Heavy drinking by inport naval personnel is facilitated by cheap and readily available liquor and is often part of traditional and condoned behavior. A common pattern is heavy drinking in port with the idea of "drying out" at sea. Such drinking patterns are associated with risks which should be recognized not only by commanding officers and ship's medical officers but by all shipboard personnel.

Most people are aware of the symptoms of acute alcohol intoxication. Characteristics such as slowed reflexes, distorted reasoning capacity, impaired muscular coordination and reduced attention span render the intoxicated man prone to accident. This fact is widely known and can at least be anticipated. Less appreciated, however, are the withdrawal symptoms which occur after a man has decreased or stopped his alcohol intake. These symptoms consist of tremulous, hallucinatory, epileptic and delirious states. Each of these symptom complexes may occur quite distinct from the others and will be described below as though it occurred in pure form. More commonly, however, the enumerated states occur in combination, with one patient exhibiting some of the characteristics of each of them. The typical candidate is the periodic or spree drinker. Heavy drinking in port followed by abstinence at sea lends itself to this pattern. The symptoms, themselves, vary in intensity and in proportion to the amount of alcohol ingested. They can occur in lesser degrees after several days of heavy drinking with the more severe forms following a month or more of chronic prolonged inebriation. It is not necessary to be an alcoholic to experience alcohol withdrawal symptoms.

Alcoholic tremulousness. The most common alcoholic withdrawal syndrome is tremulousness, also known as the "shakes" or "jitters." This syndrome usually occurs after several days to two weeks of drinking, appearing the morning after the short period of abstinence which occurs during sleep. Typically the individual will desire more alcohol to calm his nerves, like a "fix," but the same symptoms



will appear the next morning. The usual picture is that of a jumpy, easily startled individual with a flushed face and red eyes and complaining of nausea, vomiting and insomnia. He is usually inattentive to tasks and may respond to questions in a rude or perfunctory manner. The hallmark of the syndrome is a generalized, sometimes incapacitating, tremor which may be quite noticeable when the man attempts activity and during emotional stress. Although the facial flush, nausea, vomiting and tremor may disappear in a few days, the patient may not regain his composure completely for 10 to 14 days. Until that point he may not be able to sleep without sedation or operate machinery without undue hazard to himself and his shipmates.

Alcoholic hallucinosis. Symptoms of disordered visual and/or auditory sensory perception occur in about one-quarter of tremulous patients. Visual hallucinosis usually consists of nightmarish episodes associated with disturbed sleep and may be quite difficult for the patient to distinguish from real experience. Although these images may include any part of normal experience, they are commonly animate and involve human, animal or insect life. These may be quite distorted and hideous in appearance.

Acute auditory hallucinosis or "alcoholic mania" usually affects only chronic alcoholics. This syndrome includes auditory hallucinations in an otherwise well-oriented individual. The hallucinations are almost always vocal in nature and may be attributed to the patient's family, friends, neighbors or God. In most cases these voices are either addressed to the patient or are discussing him in the third person and are of an accusatory or threatening nature. The patient may barricade himself in a room, call the police, arm himself or even commit suicide to avoid what the voices threaten. These episodes may be intermittent or continuous, lasting from momentary occurrence to several weeks or months. Insight is often lost until the patient recovers, at which time it is usually fully regained. In a small number of patients the problem does not resolve and the hallucinations persist indefinitely.

Alcoholic epilepsy. There is a close connection between seizures and alcoholism, usually described by the term "rum fits." It should be recognized that heavy alcohol intake will trigger seizures in those individuals already predisposed toward them as a result of idiopathic or unexplained epilepsy, past cerebral injury or infection. Seizures can, however, be brought on for the first time in adult life entirely as a manifestation of alcoholic withdrawal. The majority of these seizures which occur in the first 48 hours after alcohol is stopped or reduced are of the generalized type during which the patient loses consciousness and postural tone and exhibits tonic-clonic muscle spasms. These seizures often accompany the more serious and often lethal delirium tremens.

Delirium tremens. Delirium tremens or "D.T.s" is the most dramatic and grave alcoholic withdrawal syndrome. It is characterized by agitation, disorientation, confusion, disordered sense perception and sometimes fatal outcome. This syndrome usually manifests itself between 72 and 96 hours after the last drink. Delirium tremens is often precipitated by a head injury, surgical operation or infection but need not be. The patient may have already exhibited several days of tremulousness, hallucinosis or seizures and may even seem to be on the road to recovery. Usually the patient becomes markedly agitated and restless and suffers vivid, horrifying visual hallucinations, frequently of animals or insects. He usually sweats profusely and has a rapid heart rate and fever. The symptoms generally become worse at night. Delirium tremens usually begins abruptly and after several days ends abruptly with the patient falling into a deep sleep. He usually awakens clear and lucid with no or only partial memory of the episode. There may, in a small



number of cases, be relapses with the entire process lasting up to four to five weeks. Single episode syndromes usually terminate in 72 hours or less. Fifteen to 20 percent of cases end in death, particularly when associated with infection or injury. In some cases, death may be sudden and for unexplained causes.

No person exhibiting alcoholic withdrawal symptoms should be allowed to perform complex tasks or make decisions upon which his own safety and that of his shipmates depend. What may seem to be mild symptoms may be only a prelude of worse to come. The heavy drinker should be educated as to the safety in addition to the health ramifications of his actions. It must be emphasized that anyone who is repeatedly drunk for prolonged periods is a good candidate for alcoholic withdrawal reaction and is a safety hazard. Such people, however, may not be able to control their habits and their fitness for duty should be viewed in that light.

- LT Mark Belkin, MC, USN  
Naval Safety Center

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## **Slimy Pollywogs Suffer Eye Problems After Shellback Initiation**

A combination of grease rubbed into their hair and detergent used to remove it led to eye problems for a group of initiates in traditional Shellback ceremonies aboard ship recently. The grease and detergent ran down into the men's eyes as they scrubbed off the "gunk" in the showers. Shortly thereafter, the men began to report to sick bay complaining of discomfort and, in many cases, inability to keep the eyes open or see clearly. Visual difficulties lasted for an average of one day, with some men unable to perform more than limited duty for two days and a few incapacitated up to four days. All personnel have recovered.

Salt water showers with liquid detergent have not in the past caused such vision problems, investigators said. This leads to the conclusion that it was the grease itself or the grease in reaction with the detergent which caused the trouble. The grease used was wire rope grease. Concurring with the ship's safety officer's recommendation that wire rope grease not be used in an initiation again, the commanding officer further stated that no grease at all will ever be used in initiations aboard the ship again.

For a general discussion of the medical problems which can ensue from a Shellback Initiation, please see "To All Slimy Pollywogs: Hear Ye, Hear Ye and Look Ye Here!" pages 34-35, BESNL 1-70.

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## **Self-Inflating Rescue Ball**

A self-inflating throwable rescue ball, slightly smaller than a softball, which inflates in the water to a 21-inch life ring capable of supporting a 300-pound person is now available in the Navy supply system. The assigned stock number is FSN 9C-4220-152-0841 and AEL 2-120014051. NAVSHIPS NOTICE 9330 of 22 Jan 1971 refers. The rescue ball is authorized as additional equipment in excess of approved allowances of unicellular ring buoys.

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## Simple Temporary Ventilation Arrangement for Hazardous Work in Close Interior Compartments

Injury reports and past personal experiences indicate that some working parties lack appreciation of the benefits of proper placement and utilization of temporary ventilation in preventing gross overexposures to toxic vapors, fumes and dust in close spaces. Lack of temporary ventilation and misapplication of ventilation have been contributory causes of close space injuries and deaths. In interior spaces where the air is being contaminated by toxic materials due to work being performed, ventilation is, in many circumstances, not only desirable but necessary. Rotation of workers and using work/rest cycles are good industrial hygiene practices for limiting an individuals exposure; however, reliance on these principles alone in a close unventilated space is dangerous. We still hear and read in injury reports that the affected individual has been cautioned to "take it easy" next time or take long "breaks" in his work when the real message should have been use properly applied exhaust ventilation plus the proper type of respirator.

In the BESNL 3-70 article, "Trichloroethylene and Trichloroethane Poisonings" circumstances and pathologic findings related to several deaths from overexposure to vapors from these chemicals were briefly described. Properly applied ventilation and other controls could have prevented these deaths. The Naval Safety Center recently assisted in the investigation of the death of a young Navy technician who was cleaning sonar equipment in a small close space in a ship. No ventilation and no respiratory protective equipment were used. Circumstantial evidence showed that about 2 pints of methyl chloroform (1-1-1 trichloroethane) were used over a short period of time. Theoretical calculations indicate the potential vapor concentration in the air (the individual's breathing zone) was in the "many thousands of parts per million" range, a concentration which can be lethal from either of two toxic mechanisms. After this fatal accident a few individuals involved in similar exposure situations were interviewed and asked what they thought went wrong. Considered important and discouraging is the fact that only one person responded correctly that exhaust ventilation should have been provided in the space at the work site with the contaminated exhaust discharged to a safe outdoor area. This same individual doing a similar job of removing grease and grime in the same type space applied a little non-hazardous penetrating oil, wiped away the emulsified grease and followed up with soap and water. The surfaces so treated were very clean and hazardous material was not needed or used--an intelligent and safe approach to the cleaning problem.

The thought occurs to us that a simplified "mickey mouse" diagram depicting a few essential features in proper placement and use of temporary ventilation where hazardous contaminants are released in close interior spaces could be useful in ship and shore safety education work. The sketch on the opposite page can be used as a basis for indoctrination of working personnel required to work in close spaces. The bottom portion of the diagram is based on "no-no's" we have seen in injury reports or witnessed in the field.

-John Maccioli  
Naval Safety Center

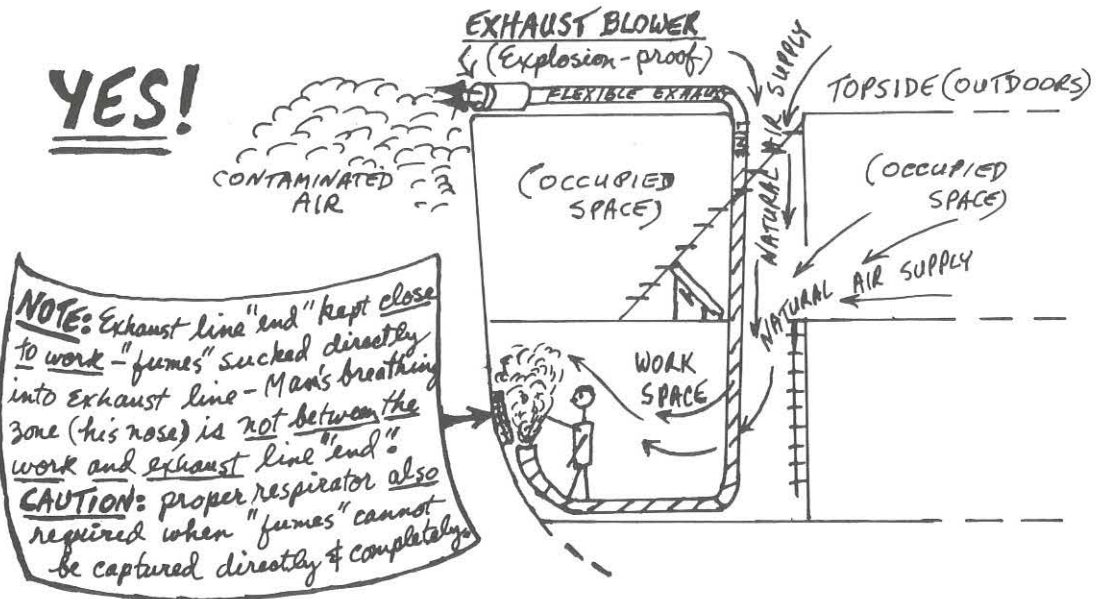
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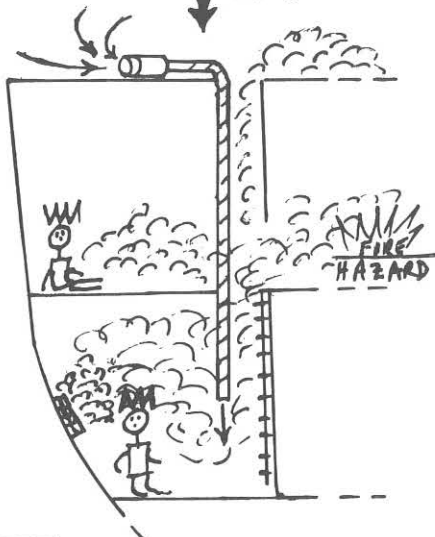
# TEMPORARY VENTILATION ARRANGEMENT

(A Guide in Releasing Toxic Materials in Close Interior Spaces)

**YES!**

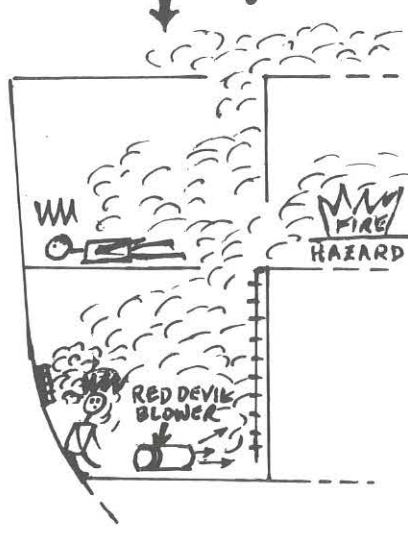


**NO-NO!**



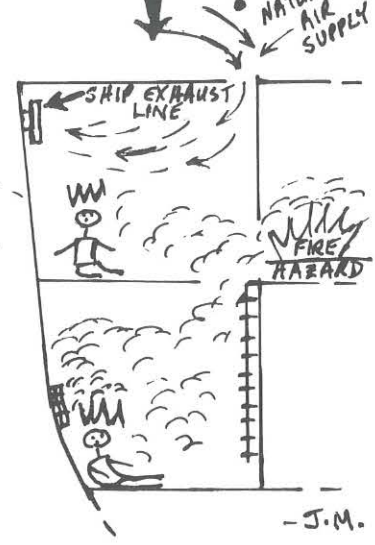
**NOTE:** BLOWER HOOKED-UP BACKWARDS - AIR BLOWING INTO SPACE CAUSES CONTAMINATION OF ADJACENT SPACES - IF MATERIAL IS FLAMMABLE, CREATES ALSO FIRE/EXPLOSION HAZARD.

**NO-NO!**



**NOTE:** BLOWER USED IN WORK SPACE - NO CONTROLLED MOVEMENT OF CONTAMINANTS (THROUGH FLEXIBLE HOSE) TO SAFE OUTDOOR AREA.

**NO-NO!**



**NOTE:** SHIP EXHAUST IN THIS CASE CAUSES "SHORT-CIRCUITING" OF AIR SUPPLY - NO VENTILATION IS PROVIDED WHERE NEEDED.

## **Safe Storage, Disposal and Handling of Pesticides**

It is imperative that all pesticides be kept in a secure storage room which can be locked when not attended. Small containers of concentrates should be kept together in a box or suitable container within the storage room. Accurate inventories of concentrates should be maintained.

Most of the original containers designed for insecticides are adequate for prolonged storage. However, stocks should be inspected frequently for detection of any leaks or unsafe storage conditions. Glass containers are excellent substitutes for containers which have become faulty. Metal containers which have not been specifically treated may be unsuitable for prolonged storage of some pesticides which have a corrosive action on some metals. Many of the emulsion concentrates and dilute oil-based insecticides are flammable. Sparkproof lighting fixtures must be installed and ignition hazards must be eliminated in closed storage areas.

All containers must be plainly labeled and kept closed. Never use empty food or drink containers to mix, pour, measure or store any pesticides.

Any pesticide which the Armed Forces have determined to be obsolete must be disposed of in accordance with the directive declaring the obsolescence. Empty containers must be disposed of in such a manner to prevent their being recovered for use as containers for food and water. All unlabeled materials must be disposed of in a safe manner. Care must be exercised in discarding unused pesticide materials. Disposal of pesticides in watering points or in streams may poison animals, including valuable wildlife. If the proper disposal of an item is uncertain, the problem must be referred to the major command concerned for direction.

Operators, who are exposed to fumes, vapors, dusts and mists of pesticides may suffer illness as a result of prolonged contact. It is as important to protect the operator with only occasional exposure.

The following are some of the primary precautions to be used in handling pesticides:

1. No smoking while handling pesticides.
2. Pesticides should be handled in well ventilated areas to minimize inhalation.
3. Shower and washing facilities must be located near pesticide-mixing areas.
4. Any contamination of the skin, particularly with liquid concentrates or solutions, must be immediately washed off with detergent and water.
5. Clothing contaminated by spillage should be immediately removed and thoroughly laundered before wearing. Special care is required to prevent contamination of the inside of gloves.
6. Clothing used in pesticide operations should not be worn for other than duty performance and should be thoroughly laundered after each use.
7. Approved respirators should be worn at all times when pesticides are being mixed and when dusts or liquids are being handled or sprayed.
8. Internal contamination of respirators, when not being worn, must be prevented. The facepiece must be washed, rinsed and dried after using. Respirator cartridges should be changed after a maximum of eight hours' use, or more often if any odor of the pesticide is detected.



Surveys aboard ship continue to indicate that some shipboard pest control programs are not well organized. It is not unusual to find programs where Navy regulations and important safety precautions have been compromised. For specific information please review SECNAVINST 5430.54A and check the pertinent instructions of the 6250 series.

The Disease Vector Control Centers and Preventive Medicine Units conduct one-day shipboard pest control courses for the purpose of providing personnel with up-to-date information on control procedures, hazards involved and safety precautions that should be exercised.

Personnel who satisfactorily complete the course will be certified to conduct the shipboard control program and handle the recommended pesticides. A certification card is issued. This card must be renewed annually by reattending the one-day course.

Two basic safety precaution excerpts from SECNAVINST 5430.54A follow:

1. "Shipboard control operations will normally be accomplished by trained ships personnel with non-controlled standard stock items under technical supervision of the Medical Department representative." Personnel of this unit have been aboard ships where watch standers, with no knowledge of pesticides or the hazards involved, are often assigned the task of applying the insecticide. Would you want to work in a space treated the night before by a person with these qualifications?

2. Pesticides shall be properly stored under lock and key in prescribed areas to prevent access by unauthorized personnel. (Notice for instance, how closely the Diazinon insecticide can resembles the Navy standard stock detergent can and the Navy standard stock salad oil can!)

-Preventive Medicine Notes  
Navy Preventive Medicine Unit 5  
San Diego, Calif.

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## ***Classic Example of Mishandling of Small Arms***

Reports of accidental injury from mishandling of small arms continue to come into the Naval Safety Center. Here's a classic example:

After dinner one day at a friend's house, two enlisted men saw a .22 caliber pistol belonging to another friend, not present at the time. They examined the pistol and determined that four of the six shells had been expended. They went outdoors and each man fired the pistol once. Back inside, they placed the pistol on a counter. Later that afternoon, one of the men picked up the pistol again to admire the pearl handle. The gun went off, inflicting a superficial flesh wound in his right chest. Investigators reported the hammer had been left cocked. The reviewing commanding officer states that all hands are being reinstructed on the dangers of "empty" firearms with this case as a classic example.

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## Correspondence Section

### **"Give Us a Hand"**

In reference to your editorial, "Give Us a Hand," in BESNL 1-71, I would like to discuss my problems and offer a suggestion. In regard to submission of an OPNAV 5100/1 Accidental Injury/Death Report, what should be done when a man is injured, say a broken finger, and he is pulled out of the shop and put to work at a desk job? The supervisor's philosophy is that the man hasn't lost a day's work so he refuses to submit the OPNAV 5100/1 report. Another problem is when a supervisor is contacted to submit an OPNAV 5100/1 report, the reply is, "What is that?" or "Why?" After the report is submitted it is sometimes incomplete. All this makes it difficult to remain within the 15-day reporting time frame.

To help the injury reporting program, I suggest articles be published in ALL HANDS, APPROACH, MECH and/or FATHOM magazines to tell "what, when, why and how" and to stress the importance of this vital segment of the Navy safety program.

General Safety Officer  
FPO San Francisco

● OPNAVINST 5100.11 is clear that an OPNAV 5100/1 report is required when a physical impairment prevents a man from performing his regularly established duty for a period of 24 hours or more subsequent to 2400 of the day of injury. The key word here is "regularly." In view of this, the answer to the question of what should be done when a man is injured and assigned another job is fill out an OPNAV 5100/1. A supervisor who refuses to submit an OPNAV 5100/1 is disobeying an instruction from the Chief of Naval Operations and should be so advised. If he still refuses, your commanding officer should be informed.

Thank you for your suggestion on publicizing the injury reporting system in various Navy publications. (Incidentally, as you no doubt know, ALL HANDS is not a Naval Safety Center magazine.) We will also continue to discuss and support the accidental death/injury reporting system in BESNL, the one Naval Safety Center publication which reaches the entire Navy.

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### **Notes of Interest from NOEHC**

The Naval Ordnance Environmental Health Center (NOEHC) announces that its 1971 Industrial Environmental Health Workshop will be held in San Francisco, 15-19 November 1971. Further information regarding the workshop will be furnished by NOEHC at a later date. Announcement is made at this time to permit advance planning.

NOEHC notes that its occupational health nursing consultant is available to assist in developing improved programs in NAVORD industrial activities and to aid in resolving special problems. Address: NOEHC (Code 048C2), 3333 Vine St., Cincinnati, Ohio 45220. Phone: (513) 684-3947, Autovon 989-3947.

Persons holding copies of BESNL 4-70 are requested to add to the listing of suggested sources of personal assistance on problems involving hazardous materials labeling, page 13: NOEHC, Code 048C, Autovon 989-3947.

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